PROGRAM OF THE 2014 ASEE-GSW CONFERENCE ON "INTERACTIVE LEARNING IN ENGINEERING EDUCATION"

Organized by Tulane University

April 2-4, 2014

Omni Royal Orleans Hotel
New Orleans, Louisiana

http://asee-gsw.tulane.edu/home/

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12:00 pm – 1:00 pm:
Opening Remarks and Lunch • Royal Garden Terrace

1:00 pm – 3:00 pm:
Concurrent Sessions

3:00 pm – 3:20 pm:
Coffee Break • Royal Garden Terrace

3:20 pm – 5:00 pm:
Concurrent Sessions

7:00 pm – 10:00 pm:
Reception/Banquet Dinner and Poster Presentations • Grand Salon

SESSION A: ENGINEERING CURRICULUM INNOVATIONS I
ROOM: ST. LOUIS/CHARTRES

Chair: Ron Anderson (Tulane U.)

1:00 pm – 1:30 pm:

"The Product Innovation Cellar: A Resource to Support Product Development in Engineering Technology" by J. Porter, J. Morgan, and W. Zhen (Texas A&M U.)

1:30 pm – 2:00 pm:

"Addressing Transfer Student Transition" by G. Jefferson, S. Steadman, , and J. Laier (U. of South Alabama)

2:00 pm – 2:30 pm:

"STEM Preparation Program: Developing Talented STEM Transfer Students" by B. Hill, E. Specking, C.S. Gattis, and C. Ellington (U. of Arkansas)

2:30 pm – 3:00 pm:

"A Reflection on Changes in Engineering Education Requirements in the Last 40 Years" by A. Karimi (U. of Texas at San Antonio)

SESSION B: HANDS-ON LEARNING AND DESIGN I
ROOM: TOULOUSE/DAUPHINE

Chair: Charles Taylor (ULL)

1:10 pm – 1:30 pm:

"Using an Arduino to Measure Frequency Response and Current-Voltage Device Characteristics in Electronics Labs" by R.S. Weis (Texas Christian U.)

1:30 pm – 1:50 pm:

"Using Arduino Microprocessor Boards in a Three Course Sequence for Programming and Digital Hardware Design" by M. Pratt (U. of Louisiana at Lafayette)

1:50 pm – 2:10 pm:

"A Comparative Analysis of Leakage Reduction Techniques in Nanoscale CMOS Arithmetic Circuits" by F. Hurtado and E. John (U. of Texas at San Antonio)

2:10 pm – 2:30 pm:

"Light Emitting Diode Performance & Optimization" by T. Howard, S. Kennedy, D. Tenner, K. Kijkanjanapaiboon, and X. Fan (Lamar U.)

2:30 pm – 2:50 pm:

"LEON2 Timing Performance in Automotive, Office Automation and Security Applications" by H. Rios[1], J.Guo[2], B. Liu[1], and E. John[1] ([1]U. of Texas at San Antonio, [2]U. of Texas at Austin)

WORKSHOP A: "IPV6 ADDRESS PLANNING WORKSHOP"
ROOM: ORLEANS ROOM

Chair: John Pickard (ECU)

Time: 1:00 pm – 3:00 pm

Agenda:

The purpose of this workshop is to briefly cover best current operational practices and guidelines to consider when building an IPv6 addressing plan. The intentioned audience for this workshop is engineering educators and industry practitioners with an interest in learning the fundamentals of IPv6 addressing and IPv6 network addressing design. This workshop is especially important for engineering educators teaching in the information technologies and computer sciences fields. It would be important for students in these fields to enter the work-force with a fundamental knowledge of IPv4 - the same is now

equally true of IPv6. Those in attendance will receive practical knowledge, hands-on exercises, and examples of hands-on labs and projects that they can take back into the classroom to supplement their current curriculum. Emphasis will be given to the following topics during the workshop:

- Structure of IPv6 addresses to include address representations and address types.
- The IPv6 address allocation model and policies of the Internet registries in assigning IPv6 address space.
- Address planning that covers guidelines to consider when building an IPv6 addressing plan such as: IPv6 subnetting, Provider Independent Addressing, Unique Local Addressing, prefix length, and assignment of Interface IDs.
- An overview of IPv6 addressing models that include: Translating an existing IPv4 based plan into IPv6, using location based subnets, and using service based subnets.
- How to manage host addressing using the three most common methods: Stateless Autoconfiguration (SLAAC), Dynamic Host Configuration Protocol for IPv6 (DHCPv6), and static addressing.
- A case study example of the above topics as well as an opportunity for some lab exercises throughout the workshop.

SESSION C: COMPUTERS IN ENGINEERING EDUCATION
ROOM: ST. LOUIS/CHARTRES

Chair: Mohammad Abdus Salam (Southern U.)

3:20 pm – 3:40 pm:

"Software Tools for Online Teaching: A Faculty Perspective" by S. McCaslin and F. Brown (U. of Texas at Tyler)

3:40 pm – 4:00 pm:

"Using Engineering Concepts to Enhance the Students' Learning in a Computer Class" by S. Liu (West Kentucky Community and Technical College)

4:00 pm – 4:20 pm:

"Learning Computer Systems' Vulnerabilities Exploitation Through Penetration Test Experiments" by T.-S. Chou and T. Mohammed (East Carolina U.)

4:20 pm – 4:40 pm:

"Hardware-based EE MOOCs as Part of Our Engineering Education Future" by D. Philips (Texas Instruments)

4:40 pm – 5:00 pm:

"VisiBoole: Visible Digital Logic Education" by J.

SESSION D: K-12 AND PRE-COLLEGE ENGINEERING
ROOM: TOULOUSE/DAUPHINE

Chair: J. Quincy Brown (Tulane U.)

3:20 pm – 3:40 pm:

"Tuskegee MSP - A Success Story" by S. Jeelani[1], M.A. Qazi[1], C. Banks[1], and K. Boykin[2] ([1]Tuskegee U. and [2]U. of Alabama)

3:40 pm – 4:00 pm:

"Translating Nano Science for Middle School for Teachers in Under-served Communities" by S. Jeelani[1] and M. Williams[2] ([1]Tuskegee U. and [2]Southeastern Consortium for Minorities in Engineering)

4:00 pm – 4:20 pm:

"Increasing the Aptitude and Confidence for Computer Science and Engineering in Texas Rural High Schools" by A. Lodgher, Y. Yang, and S. Cui (Prairie View A&M U.)

4:20 pm – 4:40 pm:

"First Year Engineering Retention" by G. Jefferson, S. Steadman, T. Thomas, and K.-T. Hsiao (U. of South Alabama)

4:40 pm – 5:00 pm:

Devore (Kansas State U.)

"STEM Modules: Developing Innovative Approaches to Enhance Student Learning" by A. Bufford, E. Andrews, M. Reeves, A. Curry, and M. Curry (Tuskegee U.)

WORKSHOP B: "WOMEN IN ENGINEERING"
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Educating undergraduate women for leadership in the 21st century

ROOM: ORLEANS ROOM

Chair: Damir Khismatullin (Tulane U.)

Time: 3:20 pm – 5:00 pm

Agenda:

This workshop will consist of four talks by leading women engineers in academia and industry, who will discuss how women engineers find their jobs and develop their own careers. Special attention will be given to strategies to eliminate the barriers that women engineers and students face in the engineering classroom and the professional career. The workshop will be concluded by round-table discussion of gender issues in engineering education and industry.

Speakers:

Ann Saterbak (Rice U.) – "Ask for the Job that You Want"

Jenna P. Carpenter (Louisiana Tech U.) – "Overcoming Barriers: Strategies for Advancing Women in Engineering"

Barbara Sprott (ExxonMobil) - "Work Life Balance: What's Right for You?"

Jessica L. Watts (CDM Smith) – "Clearing the Hurdles: One Female Engineer's Perspective on her STEM Career"

SPEAKERS OF THE "WOMEN IN ENGINEERING" WORKSHOP

Dr. **Ann Saterbak** is Professor in the Practice and Associate Chair for Undergraduate Affairs in the Bioengineering Department at Rice University. She graduated Summa Cum Laude in 1990 from Rice University with a bachelor's degree in Chemical Engineering and Biochemistry. In 1995, she earned a doctorate in Chemical Engineering from the University of Illinois at Urbana-Champaign. Saterbak joined the Bioengineering Department in 1999 following a four-year position as an Associate Research Engineer at Shell. Initially, she was responsible for developing its laboratory program. Saterbak introduced problem-based learning in the School of Engineering and more recently launched a successful first-year engineering design course taught in the Oshman Engineering Design Kitchen. Saterbak is the lead author of the textbook, *Bioengineering Fundamentals*. Saterbak's outstanding teaching was recognized through university-wide and departmental teaching awards. In 2011, she was the sole recipient of the university's most distinguished teaching award, the George R. Brown Prize for Excellence in Teaching. Because of her innovative teaching practices and her sustained mentoring of other engineering faculty, she was selected as one of 16 founding fellows in the Center for Teaching Excellence at Rice. In 2013, Saterbak received the ASEE Biomedical Engineering Division Theo C. Pilkington Outstanding Educator Award. For her contribution to education within biomedical engineering, she was elected Fellow in the Biomedical Engineering Society.

Dr. **Jenna P. Carpenter** is the Associate Dean for Undergraduate Studies in the College of Engineering and Science at Louisiana Tech University, where she also directs the Office for Women in Science and Engineering. Dr. Carpenter is PI of Louisiana Tech's NSF ADVANCE grant and previously served as co-PI on the NSF-funded Women in Engineering ProActive Network (WEPAN) Knowledge Center Project. She also served as Vice President for Professional Interest Councils on the Board of Directors for the American Society for Engineering Education (ASEE) and as Director-at-Large for the ASEE Women in Engineering Division. Dr. Carpenter currently advises on diversity and mentoring programs for a variety of NSF-funded programs and women-serving STEM organizations. She is an ABET Program Evaluator and is the Chair of the Steering Committee for the National Academy of Engineering Grand Challenge Scholars Program. She is the President-Elect of WEPAN and First Vice-President of the Mathematical Association of America.

Ms. **Barbara Sprott** graduated from Tulane University with a Bachelor of Science Degree in Chemical Engineering in 1977 and a Master of Engineering degree in Chemical Engineering in 1980. She is currently a Senior Staff Engineer at the ExxonMobil Baytown Refinery working on environmental regulatory issues. Barbara started her career as a Process Control Engineer at the Union Carbide Plant in Taft, LA supporting olefins plant control systems. She moved to the ExxonMobil Baytown Olefins Plant in 1987 as a Senior Applications Engineer. At ExxonMobil, she has held numerous positions in chemicals and refining organizations including the areas of process control, project planning, fixed equipment and inspection, instrumentation, analyzers, and environmental regulations. Her early career was spent in chemicals manufacturing primarily in development of process control applications for olefins plants and plant utilities. After holding a number of supervisory positions within ExxonMobil, she joined the Environmental Section in 1999. She has worked with the Texas Chemical Council and the Texas Oil and Gas Association in regulatory advocacy, particularly in the area of the Texas NOx regulations. She

remained in the Environmental Section where she providing support for numerous refinery units especially in the area of catalytic cracking and combustion equipment (heaters, boilers and engines). She was also an active member of the Site Mentoring Team and Diversity Pioneers. Barbara retired from ExxonMobil on December 31, 2013. Outside of ExxonMobil, Barbara has served in various capacities for the United Way of Baytown including serving as a member of the Board of Directors of the Bay Area Women's Shelter including teaching self defense courses at the shelter. She is a certified Taekwondo Instructor (retired) and 3rd Degree Black Belt. She resides in Houston, Texas and enjoys visiting family, trips home to New Orleans, martial arts, music, international travel and the New Orleans Saints. She is also currently a very novice yoga student.

Ms. **Jessica L. Watts** graduated magna cum laude with a bachelor of science degree in civil engineering from Christian Brothers University in Memphis, Tennessee in 1996. Ms. Watts was awarded the Young Engineer of the Year award by the Memphis Chapter of TSPE in 2000. Ms. Watts obtained a master of science degree in water resources engineering from the University of Texas, Austin in 2006. Ms. Watts is a certified Diplomate Water Resources Engineer with CDM Smith and has over 15 years of experience in engineering including water resources engineering and civil engineering. Her project experience includes site development, grant writing, water and sanitary sewerage, transportation, and environmental site assessments. Ms. Watts is also currently serving as the Engineer of Record for the Hollygrove Greenline, an Engineers Without Borders domestic pilot project and is on the Board of Advisors for the Building Resilience Workshop. Ms. Watts is the Greater New Orleans Section Representative of the Society of Women Engineers.

POSTER PRESENTATIONS

Chair: San Aung (Tulane U.)

Time: April 2, 7:00 pm – 10:00 pm and April 3, 8:00 am – 5:30 pm

Location: Grand Salon / Grand Salon Foyer

1. "Using STEM Modules to Enhance Middle School Science Instruction" by A. Bufford, E. Andrews, M. Curry, and A. Curry (Tuskegee U.)

2. "Development of a Rubric for Use in Assessing Transfer of Learning in Middle Grades Engineering Program Participants" by J. Harlan[1], M. Dean[2], and J. Van Haneghan[1] ([1]U. of South Alabama and [2]Mobile Area Education Foundation)

3. "Alternative Energy in the Virtual World" by K. Meche, G. Melancon, K. Ritter III, and T. Chambers (U. of Louisiana at Lafayette)

4. "Amor Vincit - Plus Size Clothing From CuO Treated Bamboo Fabric" by V. Wimberley[1], C. Turner[2], and N. Chopra[1] ([1]U. of Alabama and [2]Moundville High School)

5. "Design of Solar-powered LED Street Lamps" by D. Lewis, W. Chen, and M. Rathod (Wayne State U.)

6. "Non-contact Sensing of Torque for Magnetically Coupled Drive" by B. Dotter, W. Chen, and M. Rathod (Wayne State U.)

7. "Farmer's Cage Water Aid" by F. Valdez, E. Mendez, A. Alhassan, and S. Darayan (Texas Southern U.)

8. "How Catalyst Works - Improving Performance with Nano-Scale Structures in Water Splitting" by S. Shaik[1], D. Li[1], and S. Wehby[2] ([1]U. of Alabama and [2]U. of Alabama at Birmingham)

9. "Measurement of Particle Emissions from Gasoline and Diesel Vehicle Exhaust during Engine Start-Up" by H. Badshah[1], R. Manteufel[1], and I. Khalek[2] ([1]U. of Texas at San Antonio and [2]Southwest Research Institute)

THURSDAY, APRIL 3rd

7:00 am – 5:00 pm:
Conference Check-In • Poster Presentations • JB/Grand Salon Foyer

7:00 am – 8:00 am:
Breakfast • East Salon
ASEE-GSW Executive Committee Meeting • Petit Salon A

8:00 am – 8:40 am:
Keynote Address (Nick Altiero, ASEE President-Elect) • East Salon

8:40 am – 10:00 am:
Concurrent Sessions

10:00 am – 10:20 am:
Coffee Break • East Salon

10:20 am – 12:00 pm:
Concurrent Sessions

12:00 pm – 1:00 pm:
Lunch and Plenary session: "Online Engineering : Where are we? Where are we going?" by M. Reynolds (University of Arkansas – Fort Smith) • East Salon

1:00 pm – 3:00 pm:
Concurrent Sessions

3:00 pm – 3:20 pm:
Coffee Break • East Salon

3:20 pm – 5:00 pm:
Concurrent Sessions

SESSION E: FLIPPED CLASSROOM AND NEW TEACHING CONCEPTS
ROOM: CENTER SALON

Chair: Damir Khismatullin (Tulane U.)

9:00 am – 9:20 am:

"An Innovative Method to Apply the Flipped Learning Approach in Engineering Courses Via Web Based Tools" by R. Stanley and T. Lynch-Caris (Kettering U.)

9:20 am – 9:40 am:

"Use of Visual Worksheets in Structural Engineering Classes" by P. Hong (Southern Polytechnic State U.)

9:40 am – 10:00 am:

"Engaging the Freshman Engineering Classroom" by D. Martinez (Tarleton State U.)

SESSION F: HANDS-ON LEARNING AND DESIGN II
ROOM: WEST SALON

Chair: Sudarshan Kurwadkar (TSU)

9:00 am – 9:20 am:

"Teaching Engineering Material to Industry Technicians and Engineers" by M. Fathizadeh (Purdue U. Calumet)

9:20 am – 9:40 am:

"Development and Delivery of a First-Year "Construction Management Experience" Course" by C. McIntyre (North Dakota State U.)

9:40 am – 10:00 am:

"Tying Together Means and Methods in a Methods of Construction - Concrete and Masonry Curriculum" by S. O'Brien and D. Audo (Pittsburg State U.)

WORKSHOP C: "VISIBOOLE: VISIBLE DIGITAL LOGIC EDUCATION"
ROOM: ORLEANS ROOM

Chair: John Devore (KSU)

Time: 8:40 am – 10:00 am

Agenda:

The purpose of this workshop is to briefly cover the two types of statements that are used for Digital Designs in VisiBoole Hardware Description Language, and the two operating modes (Edit and Run) of the VisiBoole program. Copies of the VisiBoole program itself (it runs under MS Windows), and all design files used in the workshop will be distributed free of charge at the workshop. After about 40 minutes of introductory material, attendees will pick from a list of exercises to practice coding or testing already coded designs that provide a wide range of complexity and difficulty. Individualized help will be provided. The exercises to pick from include:

0. Explore unsigned and twos-complement binary numbers.
1. Write Boolean equations for six of the basic two-input Boolean operators.
2. Create a 5-input majority gate. This is a digital circuit with five inputs and one output.
3. Create an 8-bit comparator. This has 16-inputs and a single output.
4. Create a parity generator. A parity bit can be used in error detection (during data storage or transmission).
5. Create a 3-input 8-output decoder.
6. Create a 8-input multiplexer. This multiplexer has 8 data inputs, 3 select inputs, and a single output.
7. Complete the seven-segment display driver.
8. Explore the 2-bit up/down counter.
9. Create a 3-bit up/down counter.

10. Create a 3-bit counter that counts in either normal binary or gray code order.
11. Create an 8-bit loadable clearable register.
12. Explore the operation of an 8-bit counter. The design is provided in the file Counter.vbi. It contains some errors to find and fix.

SESSION G: GLOBAL ENGINEERING
ROOM: CENTER SALON

Chair: Brian Mitchell (Tulane U.)

10:30 am – 11:00 am:

"Creation of an International Engineering Student Exchange Program" by T. Chambers[1], J. Friedman[2], and G. Roy[3] ([1]U. of Louisiana at Lafayette, [2]Ryerson U., and [3]Université de Moncton)

11:00 am – 11:30 am:

"Global Experiences: Short Term Study Abroad Programs for Engineering and Technology Students" by P. Fox, T. Talbert-Hatch, and M. Bannatyne (IUPUI)

11:30 am – 12:00 pm:

"Is "sustainable Development" in Construction Actually Sustainable?" by T. Dobrowski (Purdue U. North Central)

SESSION H: EXPERIENTIAL AND PROJECT-BASED LEARNING I
ROOM: WEST SALON

Chair: Shen Liu (WKCTC)

10:30 am – 11:00 am:

"Project-based Education on Sustainability Principles for Engineers" by M. Ghose-Hajra (U. of New Orleans)

11:00 am – 11:30 am:

"Enhance Multi-Disciplinary Experience for Agriculture and Engineering Students with Agriculture Robotics Project" by Y. Wang[1], S. Cui[1], E. Risch[1], Y. Lan[2], J.-A. Lian[1], and K. Lee[1] ([1]Prairie View A&M U. and [2]Southern Plains Agricultural Research Center)

11:30 am – 12:00 pm:

"Building Confidence Through Hands-on Activities" by C. Swafford, M.K. Orr, and D. Hall (Louisiana Tech U.)

WORKSHOP D: "ENGINEERING A COURSE IN TECHNICAL ORAL COMMUNICATION FOR ENGINEERS"
ROOM: ORLEANS ROOM

Chair: Tony Eng (MIT)

Time: 10:20 am – 12:00 pm

Agenda:

Communication is an essential (non-technical) component of every engineering curriculum, and as a result, all undergraduates at the Massachusetts Institute of Technology are required to take four courses that have been designed as being "communication-intensive". Students majoring in Electrical Engineering and Computer Science (EECS) in particular are all required to take a course in technical oral communication called 6.UAT. 6.UAT piloted in Spring 2004, and is offered every semester, with an enrollment of 150-200. It is an "in-house offering" - i.e. it was both designed by and is staffed by EECS Faculty and graduate students. In this workshop, we

(1) describe the course in greater detail (lectures, recitations, assignments)

(2) take participants through some of the exercises and activities from the course, and

(3) discuss various things that we've learned in the process.

The hope is that the ideas and experiences that we gained from running this course may be applicable to similar efforts in other technical fields and engineering disciplines.

SESSION I: ENGINEERING CURRICULUM INNOVATIONS II
ROOM: CENTER SALON

Chair: Amir Karimi (UTSA)

1:10 pm – 1:30 pm:

"Teaching an Engineering Lecture in an Open Teaching Concept Classroom" by M.M. Darwish (Texas Tech U.)

1:30 pm – 1:50 pm:

"Building the Pipeline: Developing a Symposium to Prepare Engineering Students for Graduate School" by M. Cousins[1], D. Santiesteban[1], K. Peralez[1], M. Gonzalez[2], H. Rylander[1], and M.K. Markey[1] ([1]U. of Texas at Austin and [2]U. of Texas – Pan American)

1:50 pm – 2:10 pm:

"Translating an Honors Introductory Engineering Course for a Non-Honors Electrical and Computer Engineering (ECE) Population: Initial Data" by D. de la Rosa-Pohl, L. Trombetta, and V. Thomas (U. of Houston)

2:10 pm – 2:30 pm:

"Getting Students Certified: A Study of Certification Pass Rates in Information Technology Degree Programs" by C. Hopkins, J. Pickard, and A. Patrick (East Carolina U.)

2:30 pm – 2:50 pm:

"A Preliminary Report on Adapting Software Development Industry Best Practices for Undergraduate Classroom Use" by R. Swamidurai[1] and D. Umphress[2] ([1]Alabama State U. and [2]Auburn U.)

SESSION J: HANDS-ON LEARNING AND DESIGN III
ROOM: WEST SALON

Chair: Walter Lee Murfee (Tulane U.)

1:00 pm – 1:20 pm:

"Hands-on, Project-based Education in the Classroom to Solve a Real-World Problem" by C. Mebust and M. Ghose-Hajra (U. of New Orleans)

1:20 pm – 1:40 pm:

Establishing Collaborations Between Academia and Industry Through an Undergraduate Engineering Course" by M. Ghose-Hajra[1] and D. Lourie[2] ([1]U. of New Orleans and [2]Lourie Consultants)

1:40 pm – 2:00 pm:

"Krisys Robot: Experiential Learning in Product Development" by S. Kogucz, J. Aguirre, A. Alferez, and J. Morgan (Texas A&M U.)

2:00 pm – 2:20 pm:

"Hand Activated Non-Obstructive System (H.A.N.S.)" by R. Hathcoat, I. Carrillo, K. Garmon, T. Kates, and A.E. Goulart (Texas A&M U.)

2:20 pm – 2:40 pm:

"Using GoPro Hero Cameras in a Laboratory Setting" by S. McCaslin[1], M. Yong[1], and A. Kesireddy[2] ([1]U. of Texas at Tyler and [2]Synactive)

2:40 pm – 3:00 pm:

"Who Says You Can't Teach Sophomores Design: Interacting Through the Design Process" by W.L. Murfee and J.Q. Brown (Tulane U.)

WORKSHOP E: "ENGINEERING INNOVATIONS IN DISTANCE LEARNING"
ROOM: ORLEANS ROOM

Chair: Walter Buchanan (TAMU)

Time: 1:00 pm – 3:00 pm

Agenda:

Examples are presented here of engineering innovations in distance learning. A case for Massive Open Online Courses (MOOCs) will be made. The new Excelsior College MOOC, An Introduction to Cybersecurity, will serve as the backdrop for this. Introducing project - based team research into C++ programming will then be discussed. Introduction to C++ programming is required by five programs in the College of Technology at the University of Houston (computer, electrical power, mechanical, biotechnology, and computer information systems). This course has been delivered online. And from Prairie View A&M University experiences will be shared of an online course development with a focus on computer engineering related subjects. Enhancing students' learning process through mobile applications will also be discussed. Mobile learning has become an important trend for various subject areas including computer science and engineering at Southern University and A&M College. Finally, a case study of an online course in engineering and technology will be discussed that requires much innovation in the structure of the course content and in the course presentation to accommodate all learners.

1:00 pm – 1:10 pm:

Welcome and opening remarks

1:10 pm – 1:30 pm:

"A Case for MOOCs" by J. LeClair and T. Ferrer (Excelsior College)

1:30 pm – 1:50 pm:

"Introducing Project-based Team Research into a C++ Programming Course" by H. Malki and R. Lent (U. of Houston)

1:50 pm – 2:10 pm:

"Creating On-Line Materials for Computer Engineering Courses" by S. Cui and Y. Wang (Prairie View A&M U.)

2:10 pm – 2:30 pm:

"Enhancing Students' Learning Process through Mobile Applications" by M.A. Salam, H. Mohamadian, and D. Jonnala (Southern U.)

2:30 pm – 2:50 pm:

"Innovation is the Name of the Game: A Case Study of an Online Course in Engineering and Technology" by A. Mehrabian[1], W.W. Buchanan[2], and A. Rahrooh[1] ([1]Daytona State College and [2]Texas A&M U.)

2:50 pm – 3:00 pm:

Summary and closing remarks

SESSION K: SIMULATION AND VISUALIZATION TECHNOLOGIES
ROOM: CENTER SALON

Chair: Seth O'Brien (PSU)

3:20 pm – 3:50 pm:

"Visualization and Simulation for Path Planning Using MATLAB" by W. Troy and M. Thompson (Baylor U.)

3:50 pm – 4:20 pm:

"Enhanced Learning Experiences Through Effective Use of Simulation and Visualization Technologies for Demonstration of Environmental System Modeling" by S. Kurwadkar (Tarleton State U.)

4:20 pm – 4:50 pm

"Enhancing Civil and Construction Engineering Education through the use of a Web-based Collaborative Simulation" by T. Korman (California Polytechnic State U. – San Luis Obispo)

SESSION L: COLLABORATIVE AND DISTRIBUTED LEARNING
ROOM: WEST SALON

Chair: Lev Kaplan (Tulane U.)

3:20 pm – 3:40 pm:

"Facilitating Collaboration Across STEM Fields in Program Development" by J. Ejiwale (Jackson State U.)

3:40 pm – 4:00 pm:

"Improving Student Persistence in Computer Programming Courses with Pair-Testing" by R. Swamidurai (Alabama State U.)

4:00 pm – 4:20 pm:

"Reviewing Circuit Basics Through the Use of a Card Game" by J. Schwartz (Queensborough Community College)

4:20 pm – 4:40 pm:

"Improving Teaching by Eliminating Student Dislikes" by R.D. Manteufel (U. of Texas at San Antonio)

4:40 pm – 5:00 pm:

"The Integration of Collaborative Learning and Computer Technology in Biomedical Engineering Education" by D.P. Gaver, III (Tulane U.)

WORKSHOP F: "NANO SCIENCE FOR MIDDLE SCHOOL FOR TEACHERS IN UNDER-SERVED COMMUNITIES" (K-12 AND PRE-COLLEGE ENGINEERING)
ROOM: ORLEANS ROOM

Chair: Michele Williams (Georgia Tech)

Time: 3:20 pm – 5:00 pm

Agenda:

Since 1975, the Southeastern Consortium for Minorities in Engineering has worked interest and prepared more underrepresented students for college and careers in STEM. Recently, Tuskegee University was awarded an NSF Math Science Partnership award to develop and deliver Nano Science content for middle schools in the Alabama Black Belt. This partnership among universities, K-12 and industry offers tremendous potential for improvement of K-12 academic outcomes in one of the nation's most economically challenged regions. The project provides an opportunity for science-rich institutions to engage their surrounding communities, providing students access and opportunity for academic achievement in STEM. As a partner in this MSP project, SECME provides a delivery vehicle for the innovative content being developed by the MSP partners through its annual Summer Institute. Utilizing

the SECME **framework** for professional learning communities led by Master Teacher Mentors who follow participants' progress and support implementation, SECME provides an opportunity to enhance the impact of the content developed. SECME also extends the project impact with its student competitions and projects and parent engagement strategies. This workshop will provide examples of the content modules in Nano science developed by participating faculty geared toward middle school. We will discuss strategies used to integrate the Materials Science concepts with 6th, 7th and 8th grade teaching standards and the process for training educators. The workshop will provide data from the first two years' evaluation of the SECME Summer Institute and discuss the Institute as a vehicle for improving STEM instruction in underserved communities. The partnership of SECME with the Tuskegee Nano Bio Math Science Partnership for the Alabama Black belt offers a unique opportunity for research, evaluation and improvement of the content, tools/processes for delivery of professional development and the evaluation of its efficacy and impact over time and in the classroom.

KEYNOTE SPEAKER
Thursday, April 3rd, 8:00 am – 8:40 am
East Room

Dr. **Nicholas J. Altiero** received a Bachelor of Science degree in aerospace engineering from the University of Notre Dame in 1969 and a Master of Science degree in aerospace engineering in 1970, a Master of Arts degree in mathematics in 1971 and a Doctor of Philosophy degree in aerospace engineering in 1974 from the University of Michigan, Ann Arbor. Following postdoctoral appointments at the University of Michigan and at the Department of the Interior's Twin Cities Research Center, he joined the faculty of the Materials Science and Mechanics department at Michigan State University in 1975. At Michigan State, he advanced through the faculty ranks to the rank of Professor in 1986 and, in 1990, he was named the Associate Dean for Research and Graduate Studies of the College of Engineering, where he had administrative responsibility for the research, technology transfer, graduate studies and distance education operations of the college. In January 1998, he was named Chairman of the Department of Materials Science and Mechanics and he served in that position until June 2000. At that time, he joined the faculty at Tulane University as Dean of the School of Engineering. In 2006, in the aftermath of Hurricane Katrina, Tulane University was restructured and Altiero was named the inaugural Dean of the School of Science and Engineering. Altiero has held visiting positions at the Polytechnic University of Milan, Italy, as a Fulbright Scholar, and at the Technical University of Aachen, Germany, as an Alexander von Humboldt Fellow. He has published extensively in the areas of computational mechanics, fracture mechanics, geo-mechanics, and bio-mechanics and has received external funding for research, teaching and other projects from the National Aeronautics and Space Administration, the National Science Foundation, the Department of Energy, the Centers for Disease Control and Prevention, the Economic Development Administration, Ameritech, Consumer's Power, the Edward Lowe Foundation, Ford Motor, Garrett Turbine Engine, General Dynamics, General Electric Foundation, General Motors, the Industrial Technology Institute, and the Michigan Department of Commerce. He has taught a wide range of courses at the undergraduate and graduate levels and, in 1991, received the State of Michigan Teaching Excellence Award.

Altiero is a fellow of the American Society of Mechanical Engineers (ASME), a fellow of the American Society for Engineering Education (ASEE), and a member of the Sigma Xi Scientific Research Society and Tau Beta Pi Honorary Engineering Society. He currently serves as President-Elect of the ASEE and as a member of the ASEE Board of Directors. He also serves on the Louisiana Innovation Council, the EPSCoR Committee of the Louisiana Board of Regents, the Nominating Committee for the Southeast Louisiana Flood Protection Authorities, the Executive Board of the Louisiana Universities Marine Consortium (LUMCON), the Board of Trustees of the Advocates for Science and Math Education (Sci High), the Board of Directors of the Alliance for Science and Technology Research in America (ASTRA), the Board of Directors of Building Louisiana Science and Technology (BLAST), and as Vice President of the Board of Directors of the Greater New Orleans Science, Technology, Engineering and Mathematics (STEM) Initiative (Core Element). He previously has served as Chairman of the ASEE Engineering Deans' Council, Chairman of the ASEE Engineering Research Council, as Chairman of the Council of Deans Subcommittee of the National Aeronautics and Space Administration's Aeronautics Research Advisory Committee, as Chairman of the Board of Trustees of the Department of Energy's National Institute for Global Environmental Change, as a member of the ASME Task Force on Federal Engineering Research Funding, as a member of the Louisiana Governor's Advisory Task Force on Funding and Efficiency of the Department of Environmental Quality, as a member of the Louisiana Governor's Emergency Preparedness Advisory Council as a member of the Board of Trustees of the Southeastern Universities Research Association (SURA) and as a member of the Board of Directors of Wink Companies, LLC.

PLENARY SPEAKER
Thursday, April 3rd, 12:00 pm – 1:00 pm
East Room

Dr. **Michael Reynolds** received a Bachelor of Science degree in mechanical engineering from Marquette University in 1996, and a Master of Science degree in mechanical engineering in 1999 and a Doctor of Philosophy degree in mechanical engineering in 2004 from Purdue University. Dr. Reynolds' research background is in control systems, specifically in optimal control with flexible systems. Dr. Reynolds has conducted funded research in Biomechanics, Acoustic Metamaterials and Engineering Education. He is an Associate Professor and Department Head of Engineering at the University of Arkansas - Fort Smith and the Editor-In-Chief of the Journal of Online Engineering Education (JOEE). The JOEE is the world's leading publication covering such topics as MOOCs, hybrid courses, and online degrees.

Plenary talk abstract:

It has been nearly 10 years since the highly cited “Online Engineering Education: Learning Anywhere, Anytime” was published by the Sloan Foundation. While adoption of some online strategies, degrees and programs has occurred, there have not been sweeping changes. The history of technology, and the recent history of online education, point to a future where online learning will become much more prevalent in the coming years. While there is much to be gained by increasing access, there are also pitfalls. How much are institutions using the Internet now? What works (and what does not) with online engineering education? What are other developments that have potential to change engineering education online? What could the future hold? These are questions that will be addressed and answered.

FRIDAY, APRIL 4th

7:00 am – 8:00 am:
Conference Check-In • JB/Grand Salon Foyer
Breakfast • East Salon
ASEE-GSW Executive Committee Meeting • Petit Salon AB

8:00 am – 10:00 am:
Conference-wide workshop on "Training Engineers Through Industry/Academia Partnerships" • Center/West

10:00 am – 10:20 am:
Coffee Break • East Salon

10:20 am – 12:00 pm:
Concurrent Sessions

12:00 pm – 1:30 pm:
Lunch • Award Presentation and Closing Remarks • East Salon

1:30 pm – 3:00 pm:
Annual Business Meeting • West Salon

CONFERENCE-WIDE WORKSHOP G: "TRAINING ENGINEERS THROUGH INDUSTRY/ACADEMIA PARTNERSHIPS"
ROOM: CENTER/WEST

Chairs: Michael Dancisak (Tulane U.) and Malay Ghose-Hajra (UNO)

Time: 8:00 am – 10:00 am

Agenda:

Training through hands-on experiences in the classroom and lab has been a hallmark in engineering education. This workshop provides a platform to launch a real-world project-based engaged-learning initiative for corporate and small business members to interact with faculty from higher education institutions to develop partnerships that enhance Science, Technology, Engineering, and Mathematics (STEM) curricula for current students across engineering disciplines.

Benefits to Employees and Engineering Students: trainees apply classroom theory to analyze or design a real-world project, trainees learn to work under experienced professional engineers or university researchers, trainees develop or refine professional communication and presentation skills (written and verbal), trainees learn about the necessary skills and benefits of working with or around a team, trainees experience proper time management, trainees learn about professional liability and how to avoid costly mistakes, trainees get the opportunity to network with industry and university peers, future job opportunities or adjunct teaching positions.

Benefits to Faculty: faculty makes contact with key players of the local industry, opportunity for faculty to collaborate with industry mentors on joint publications, opportunity for faculty to collaborate with industry practitioners on research activities, consulting opportunities, and feedback from industry practitioners to help faculty improve the course content.

Benefits to Industry: provide input on curricular issues that affect future workers in industry, provide direct to engineers in training for skills assessment, opportunities connect and directly evaluate prospective interns, opportunity for industry mentors to collaborate with faculty on joint publications, develop avenues for joint research collaborations, excellent public relations and outreach development activities, enjoyment of giving back to the profession.

8:00 am – 8:05 am:

Welcome and opening remarks

8:05 am – 8:30 am:

Keynote address by Greg Auda (Synthes / Johnson & Johnson)

8:30 am – 9:50 am:

Learning modules

- Engineering pedagogy
  Moderators: Ronald C. Anderson (Tulane U.) and William W. Gwyn (Eustis Engineering Services)
- Human resources approach to engineering curriculum and internships
  Moderators: Tonja Koob Marking (Gaea Consultants) and Norma Jean Mattie (U. of New Orleans)

- Licensing, nondisclosure agreements and patent rights
  Moderators: John Christie (Tulane U.) and R. Andrew Patty II (McGlinchey Stafford)
- Legal aspects of partnerships
  Moderators: Jaye A. Calhoun (McGlinchey Stafford) and Dinah M. Payne (U. of New Orleans)

9:50 am – 10:00 am:

Summary and closing remarks

SESSION M: VIRTIAL REALITY- AND COMPUTER TECHNOLOGY-BASED LEARNING
ROOM: CENTER SALON

Chair: Charles Taylor (ULL)

10:20 am – 10:40 am:

"Interactive Virtual-Reality Driven Learning Framework for Engineering and Science Education" by E. Biglari and Y. Feng (U. of Texas at San Antonio)

10:40 am – 11:00 am:

"Interactive Alternative Energy Educational Gaming in a Virtual Reality Environment" by K. Ritter, III and T. Chambers (U. of Louisiana at Lafayette)

11:00 am – 11:20 am:

"Recommending and Selecting Appropriate Resources during On-line Problem Solving" by G. Krudysz and J.H. McClellan (Georgia Institute of Technology)

11:20 am – 11:40 am:

"Using Coastal Louisiana to Develop Hydrologic Web-based Learning Modules" by M. Bodin and E. Habib (U. of Louisiana at Lafayette)

11:40 am – 12:00 pm:

"If You Can't Beat Them, Use Them: Putting Students' Smartphones to a Good Use in an Introductory Physics Classroom" by J. Shakov (Tulane U.)

SESSION N: EXPERIENTIAL AND PROJECT-BASED LEARNING II
ROOM: WEST SALON

Chair: Suxia Cui (PVAMU)

10:20 am – 10:50 am:

"The Modular Integrated Stackable Layers System: A NASA Development Partnership" by T. Perkins, K.G. Astley, T.B. Navarrete, P.B. Delaune, and J.A. Morgan (Texas A&M U.)

10:50 am – 11:20 am:

"Utilizing Commercially Available Products to Demonstrate Reverse Engineering Concepts in Electronic Systems Product Development Courses" by A. Carrillo, T. Kopp, L. Jenschke, M.J. Leonard, J.A. Morgan, and J. Porter (Texas A&M U.)

11:20 am – 11:50 am:

"Educational Project on Decision Support System for Precision Agriculture" by S. Cui, Y. Wang, E. Risch, and D. Bourgeois (Prairie View A&M U.)

WORKSHOP H: "NANOMATERIALS AND LIGHT INTERACTIONS IN WATER" (K-12 AND PRE-COLLEGE ENGINEERING)
ROOM: ORLEANS ROOM

Chairs: Karen Boykin and Dee Goldston (U. of Alabama)

Time: 10:20 am – 12:00 pm

Agenda:

This workshop will present inquiry based classroom materials developed to introduce 1) principals of light and 2) concepts of emerging water quality issues to be considered with new man-made processes and products. Specifically exercises introduce to students to different materials that may be in water and how light can be used to explain property differences of the material. Three concepts of light introduced are Tyndall Effect, Rayleigh Scattering, and light absorption and fluorescence of dye molecule. Samples are made to explore how red and green laser light and light properties, including wavelength, differ between samples with water, milk, and dye. Young scientists learn how nanomaterials are made, how they used in every day products, and how they could potentially enter the environment. This short demonstration provides guidance as to how one might visualize different light-material interaction, and understand the underlying fundamental physics and chemistry concepts. Building on research and pilot demonstrations, the exercises were designed around the use of the 5E's instructional model for Engaging, Exploring, Explaining, Extending and Evaluating science concepts. Lastly, students evaluate their results through discussion of how cells and molecules can interact.

KEYNOTE SPEAKER
Friday, April 4th, 8:05 am – 8:30 am
Center/West

Mr. **Greg Auda** is currently a 17 year employee of Johnson & Johnson. He has recently been assigned to manage key strategic accounts on behalf of the orthopedic sector of J&J. In this role he will seek to assist key customers with the changing dynamics of the healthcare market and their relationships with partner companies such as J&J. Most recently Greg has been in Business Development with DePuy Synthes CMF Division, charged with the identification, negotiations, close and integration of all targeted acquisition / licensing partners. In addition he and his team established the first Strategic Account Management program for DePuy Synthes CMF Division. He has held several sales & marketing positions with a variety of small to mid-size medical device companies. These include: Accellent the Largest provider of outsourced design, engineering and manufacturing services to the medical device industry, where he ran the marketing dept. and stints with 2 small startups in the medical device space. In his original tenure with J&J Greg worked in the Codman Division, whose mission is providing the highest quality devices and implants to the neurosurgery market. There he held a variety of positions including International marketing for Latin America & Asia pacific, product development roles, and sales management at several levels.

ABSTRACTS OF CONFERENCE PRESENTATIONS

SESSION A: ENGINEERING CURRICULUM INNOVATIONS I

The Product Innovation Cellar: A Resource to Support Product Development in Engineering Technology

Jay R. Porter, Joseph A. Morgan, and Wei Zhan
Electronic Systems Engineering Technology
Texas A&M University

Recently, the Electronic Systems Engineering Technology (ESET) program at Texas A&M University has undergone a major curriculum revision. The program, once focused on producing graduates for the general electronics and telecommunications industries, now has a strong emphasis on electronic product and system development. As the faculty moves forward with this initiative, extensive effort has also been put into creating real-world product development experiences that augment the theory presented in the lectures. In fact, the curriculum culminates in an major experiential learning course sequence where students form pseudo-startup companies, brainstorm ideas for products, find funding for their ideas, and then design/implement/test a functional prototype of their product. As one can imagine, in order for students to be successful in this endeavor, they need to have access to a substantial number of resources. To this end, the faculty in ESET developed the idea for the Product Innovation Cellar (PIC) in the Summer of 2011. Over the course of the next year and a half, the necessary funding was acquired and then the new facility was designed and built. Today, the PIC provides our students with a 3400 sq ft state-of-the-art facility that offers them the resources to be successful including: 1) a reconfigurable development area with workbenches and lockable storage; 2) a collaboration room that supports customer interactions; 3) separate prototyping areas for electronics, mechanical systems and software development; 4) a part store that carries inventory for prototyping electronic and mechanical systems, and 5) a small breakroom. The PIC is now a functional facility that has supported numerous capstone projects as well as multiple offerings of the program's course on product development. This paper will present a detailed description of the PIC and discuss the many issues involved in supporting such a facility including funding, maintenance and sustainability. The paper will also present the lessons learned to date.

Addressing Transfer Student Transition

Gail D. Jefferson[1], Sally Steadman[2], James Laier[2]
[1]Mechanical Engineering, [2]Civil Engineering
University of South Alabama

The University of South Alabama has implemented a comprehensive program for transfer students majoring in engineering, utilizing a community building model. A seminar has been created to familiarize students with university resources, academic success skills, and engineering productivity tools, such as Excel. The seminar also helps students recognize when they need assistance and how to effectively seek help. Group activities encourage the development of team skills and facilitate the formation of study groups. Faculty and student mentor triads are formed to further assist in the transfer process, providing an opportunity for direct interactions with faculty and upper-class students.

STEM Preparation Program: Developing Talented STEM Transfer Students

Bryan Hill[1], Eric Specking[1], Carol S. Gattis[2], and Cassandra Ellington[1]
[1]College of Engineering, [2]Honors College
University of Arkansas

Demand for STEM workers in the USA is expected to increase by 17% between 2012 and 2018 to over 8.6 million. The percent of Arkansas residents with any college degree (associates or higher) has increased from 18% to 26% over the last decade, however has decreased by 20% for STEM degrees. In 2009, Arkansas (an EPSCOR state) ranked 47th in STEM bachelor's degrees per capita awarded. Currently, engineers make up 0.53% of Arkansas' workforce compared to 1.12% for the entire USA, forcing many Arkansas employers to fill STEM positions with out-of-state or international labor. If Arkansas' STEM pool does not double, the unmet demand for talented young scientists and engineers may lead employers to move their technology centers to another state, leaving Arkansas even further behind economically. To increase access to and success in STEM education in Arkansas, the University of Arkansas (UA) developed and led a statewide collaboration between its College of Engineering, its College of Arts & Sciences and all of the 22 two-year colleges (TYC) in Arkansas. The resulting STEM Preparation Program was designed to increase the number of TYC students who complete STEM preparatory courses, then successfully transfer to and graduate from a four-year STEM degree program. The project goals are three-fold: 1) better prepare Arkansas' TYC students for BS STEM programs by providing online versions of the UA STEM foundation courses/labs currently not offered at Arkansas' TYCs; 2) recruit high school and TYC students into STEM studies with scholarships covering the tuition gap between the TYC and UA tuition; and 3) provide enhanced academic and social support services to ease transfer students' transition. Development of the program, the first four STEM courses (Calculus I and II, University Physics I and Introduction to Engineering), enrollment projections, evaluation measures, future impacts and lessons learned will be presented.

A Reflection on Changes in Engineering Education Requirements in the Last 40 Years

Amir Karimi
Mechanical Engineering Department
The University of Texas at San Antonio

In the last 40 years, there have been many changes in how students are being educated. Many new engineering topics have been added in coverage of each engineering course. New degree programs have been created and new tools and resources have become available for teaching and learning engineering subjects. Even though there are more materials being covered in many engineering programs, the number of semester credit hours required to obtain an engineering degree has been reduced in recent years. In 1970's the first year and half to two years of curriculum was common among all engineering programs. Today only some of the math and science degree requirements are common among various engineering programs, even though there is a great deal of talk about multi disciplinary and team work. In 1960's and 70's all engineering students took the same course in introduction to engineering, but now that course is specialized for each discipline. All engineering students took a common graphic course, but now may engineering disciplines do not even require a course in engineering drawing. This paper will describe the reasoning for some of these changes and reflects on the positive and negative aspects of these changes.

SESSION B: HANDS-ON LEARNING AND DESIGN I

Using an Arduino to Measure Frequency Response and Current-Voltage Device Characteristics in Electronics Labs

Steve Weis
Department of Engineering
Texas Christian University

Most of our students learn electronics in lab; comparing their design and analysis work with lab measurements allows them to understand concepts more completely. Using the Arduino microcontroller to semi-automate repetitive measurements accomplishes two of our educational goals. First, since we are trying to accomplish as much as possible in lab - streamlining data-taking is helpful. Second, it allows us to employ a microcontroller in a useful way. As embedded microcontrollers become ubiquitous, we want to include them throughout our curriculum. There are several options for software control of the Arduino's data acquisition process. We chose to use MATLAB since we have it available and our students use it. Three example instrumentation circuits and their associated MATLAB scripts are presented: (1) measurement of the I-V characteristic of a diode, (2) measurement of the common source I-V characteristics of a MOSFET, and (3) measurement of a simple filter's frequency response.

Using Arduino Microprocessor Boards in a Three Course Sequence for Programming and Digital Hardware Design

Michael Pratt
Electrical and Computer Engineering
University of Louisiana at Lafayette

We are implementing a set of experiments and programming exercises, centered on Digilent, Inc. microprocessor boards, to expose our first semester Computer Science and Electrical Engineering students to micro-processor/micro-controller programming. Our students take a three course digital sequence where the first course covers the basics of Boolean Algebra and Logic Design. The second course introduces sequential logic and design of digital systems, including basic computer design. The final course in 'Microprocessors' involves assembly/machine code programming and using high-level languages to program microprocessor boards. We plan to introduce our students early on to programming as a way to expose them to logical thinking and as a way to simulate digital logic devices. The Digilent, Inc. boards allow students to download programs and interact with the programs via switches, LEDs, and other Input/Output ports provided by the boards. These Arduino capable boards will allow students to perform simple tasks and develop intricate projects in the microprocessors course as they progress in knowledge. We will describe our introductory course lessons and plans to migrate the other courses to exercises based on these microcomputer boards.

A Comparative Analysis of Leakage Reduction Techniques in Nanoscale CMOS Arithmetic Circuits

Frank Anthony Hurtado and Eugene John
Department of Electrical and Computer Engineering
The University of Texas at San Antonio

In this undergraduate research, various leakage reduction techniques such as power gating, multiple threshed voltage and high k-dielectric are investigated. These techniques and their effectiveness are

explored by experimentation on various nanoscale CMOS arithmetic circuits. These circuits include full adders, combinational multipliers, Booth multiplier and divider circuits. Using Predictive Technology Models (PTM) of CMOS transistors in the 32, 45, 65 and 90 nanometer technology nodes, threshold voltage and power gating is applied to the arithmetic circuits to experiment the efficiency and viability of such method and their limitations. Power gating with high-K transistors is then investigated to analyze the effects of such a combination. Finally, the results are compared and the effectiveness of the various leakage reduction techniques is analyzed. Threshold voltage change proved to have the most impact on performance and less of an impact on leakage reduction while power gating offered no significant performance drop and the highest impact on leakage power reduction.

Light Emitting Diode Performance & Optimization

Trevor Howard, Seth Kennedy, Derek Tenner, Kasemsak Kijkanjanapaiboon, and Xuejun Fan
Department of Mechanical Engineering
Lamar University

With technology paving the road for economic solutions that will reduce the amount of energy consumed, Light Emitting Diodes (LEDs) are quickly becoming a popular and the desired form of illumination. LEDs are up to ten times more efficient than incandescent lights and are double the efficiency of compact fluorescent lights (CFLs). While CFLs are comparable in efficiency, they contain mercury and produce ten times the amount of heat as an LED. Another advantage of LEDs is that they can withstand a wider range of environments. The LEDs used for household lighting produce blue light. To provide the desired white light, they are manufactured with a yellow silicone phosphor encapsulant. While the encapsulant allows for the emitting of white light, it has a few disadvantages. One in particular is that some of the light output is reduced which leads to a decrease in efficiency, and perhaps the biggest downside is the change in light output color over the lifespan of the LED. Due to the heat generated inside the LED and other environmental factors, the silicone phosphor encapsulant hardens and degrades over time. While the change in color is common among other types of light bulbs, it is more often noticed in LEDs due to their longer lifespan. The efficiency and lifespan of LEDs has been well documented. Of all of the factors that contribute to the long life and high efficiency of LEDs, the junction temperature is one of the most crucial. The junction temperature of the LiteOn 5630 LED was estimated using thermal modeling from data collected from a LabSphere Illumia® Light Measurement System. This system allows a myriad of performance data to be gathered and analyzed from nearly any light source. The results have shown that purity, efficacy, and efficiency are all related to the LED's junction temperature. By having a clearer understanding of how external temperature and LED module design affects junction temperature, the industry will have a more accurate estimation of LED lifespan and efficacy at real world operating conditions. This research is funded by a Lamar University Office for Undergraduate Research Grant.

LEON2 Timing Performance in Automotive, Office Automation and Security Applications

Heleodoro Rios, Jiaxin Guo, Bao Liu and Eugene John
Department of Electrical and Computer Engineering
The University of Texas at San Antonio

This paper examines the timing performance of the LEON2 processor using MiBench benchmarks in the embedded application domains of automotive, office and security industries. By measuring the total run time of each benchmark and dividing the run time by the clock period, the total number of cycles could be determined. In order to run each benchmark and find their run time, the benchmark source codes were

cross compiled using the BCC cross-compiler utility to get the desired machine code needed by the LEON2 processor SPARC architecture. The resulting binaries were directly placed into the processor data file RAM on the LEON2 microprocessor. Then QuestaSim 6.4c was initialized with a fixed clock period of 20 ns to simulate the LEON2 processor running each of these benchmarks. Since each benchmark varied in size and tested different functionalities, the results were diverse ranging from short to long simulation times. The longer being basicmath within the Automotive package with 227,063,029 cycles and the shortest being *stringsearch* with 555,807 cycles from the Office Automation package. This LEON2 processor simulation-based research project well compliments the undergraduate curriculum by given a deeper understanding on computer architecture and digital system simulation techniques. It further provides an excellent opportunity for the participants to improve research and development skills such as literature review, technical writing and presentation.

SESSION C: COMPUTERS IN ENGINEERING EDUCATION

Software Tools for Online Teaching: A Faculty Perspective

Sara McCaslin and Fredericka Brown
Department of Mechanical Engineering
University of Texas at Tyler

Many engineering programs across the country are looking into online courses as a means of expanding their programs and broadening their student demographics. Inherent in online education is the use of computer software tools, but not all tools serve to support student learning and evaluation. This paper will discuss the software tools used by two faculty members who converted five different mechanical engineering courses, both undergraduate and graduate, into fully online courses. The focus will be on software tools used in material presentation, evaluation, and interaction. The discussion will include the reasoning behind the choice of these tools and both the pros and cons from the perspective of the authors, as experienced over four semesters of teaching online.

Using Engineering Concepts to Enhance the Students' Learning in a Computer Class

Shen Liu
Division of Science and Mathematics
West Kentucky Community and Technical College

At West Kentucky Community and Technical College, all pre-engineering majored students are required to take a computer class: Computational Techniques and Tools for Mechanical Engineers. The course introduces students with various modern computational tools, including LabVIEW, MATLAB and Excel. LabVIEW is a graphical programming language that has been extensively used in engineering and physics disciplines for data measurement and control. The class has traditionally focused on teaching computer codes and algorithms to run various programs, therefore the students do not see the connections between LabVIEW and engineering applications. We have recently incorporated teaching engineering concepts into the curriculum. Students would write LabVIEW programs not just for completing computer codes but rather for understanding some engineering principles. The effort has greatly enhanced the students' interests in the subject and better prepared them for future engineering classes.

Learning Computer Systems' Vulnerabilities Exploitation Through Penetration Test Experiments

Te-Shun Chou and Tijjani Mohammed
Department of Technology Systems
East Carolina University

This paper describes a project that focused on the study of the exploitation of information systems' vulnerabilities in an intrusion detection and incidents response graduate course. The project incorporated a series of penetration testing labs and provided detailed instructions for students to conduct essential hands-on activities in a step-by-step fashion. The labs included footprinting, ARP poisoning, man-in-the-middle attack, IP spoofing, exploitation, and collecting victims' data. In this paper, these labs will be described, along with the evaluation results of the project.

Hardware-based EE MOOCs as Part of Our Engineering Education Future

Douglas Philips
University Marketing & Engineering Workforce Development
Texas Instruments

You can enroll in MOOCs from the most elite universities - linear algebra from MIT, astrophysics at the University of California Berkeley, or introduction to theory of literature at Yale. These classes can be taken by anyone, nearly anywhere in the world, and often times for free. It is just the latest evolution in the ongoing movement to improve education. But most MOOCs exist in a one-direction environment, meaning a professor will tape a series of lectures, offer a test at the end and that's it: no physical or hands-on component. In a MOOC biology class for example, you don't dissect a frog in your living room. But what if, in an electrical engineering MOOC, there was a hands-on element? That's where TI comes in. TI has partnered with the University of Texas at Austin for their UT.6.01x class on embedded systems. This is a learn-by-doing course that shows you how to build solutions to real-world problems using embedded systems. The class will unravel how electronic gadgets are designed, developed and built as embedded systems that shape the world. This is really the difference in what TI sees the future of MOOC education to be. TI is offering the physical element of the class in the home. The Tiva C Launchpad required for this course is small and low-cost, so universities can wrap classes around them that make the at-home environment viable for online learning. For $20, a student in the far reaches of the globe can acquire a higher level of education. The University of Texas at Austin course is a real bellwether for the future of these types of MOOCs. TI is in talks with many of the top engineering universities in the United States to implement similar programs for their MOOCs if UT.601x is a success.

VisiBoole: Visible Digital Logic Education

John J. Devore
Department of Electrical and Computer Engineering
Kansas State University

A novel software tool, called VisiBoole, provides a color-coded interactive display of simulated Boolean values. The Boolean values being displayed are named Boolean variables. They include both independent (input) and dependent (output) variables. Dependent variables are defined via Boolean equations. Their values are dynamically calculated from their defining equation based on the current values of the variables they are dependent on. Thus, VisiBoole provides a simulation and visualization

for what amounts to an extremely simple hardware description language (HDL). The major aspects of that simplification is supporting only two- valued variables and two types of statements. Because of the two-value restriction, variables do not need to be declared – their role is determined by the context of their use. The two statement types are a variable-list statement and a Boolean assignment statement. Circuits expressed in assignment statements may be combinational or sequential in nature. Sequential circuits are created whenever a flip-flop is implied in the assignment. This is specified by appending a .d suffix to the output variable name on the left hand side of the assignment statement. This turns the variable into a state variable and makes it an independent variable – only its D input is dependent on other variables. Inputs (independent variables except state variables) must appear at least once in a variable-list statement. Both independent and dependent variables may appear as often in any variable-list statement and in as many such statements as is desired. Statements may appear in any order without affecting the results. This contributes to the simplicity of using the tool, and is also a teaching point. This point being that a set of HDL equations is different from a set of software language assignment statements. The HDL equations are evaluated in parallel whereas the software set are evaluated in sequence – top to bottom. VisiBoole has two modes – edit and run. They exist as tabs on the main display. Designs are created in edit mode and exercised (tested) in run mode.

SESSION D: K-12 AND PRE-COLLEGE ENGINEERING

Tuskegee MSP - A Success Story

Shaik Jeelani[1], Mohammed A. Qazi[1] and Carol Banks[1], and Karen Boykin[2]
[1]Tuskegee University and [2]University of Alabama

A partnership consisting of institutions of higher education in Alabama, school districts in the state's Black Belt region, along with other organizations is actively working to improve science education in grades 6th-8th in these districts. The partnership is supported through an award by the National Science Foundation, under the Math and Science Partnership (MSP) program. It is led by Tuskegee University and consists of four doctoral granting institutions, five community colleges and ten school districts in the Alabama's Black Belt region, serving 82 science teachers and 8000 students in 6th-8th grades. A key activity is the development of NanoBio science-based course modules and 3-D simulation of science concepts by STEM and education faculty and master teachers for delivery in an inquiry-based setting in the partner schools. This paper describes the forging of the partnership, the interventions that are designed to address challenges in science education in the partner school districts, and the project's implementation and research framework.

Translating Nano Science for Middle School for Teachers in Under-served Communities

Shaik Jeelani[1] and Michele Williams[2]
[1]Tuskegee University and [2]Southeastern Consortium for Minorities in Engineering

Since 1975, the Southeastern Consortium for Minorities in Engineering (SECME) has worked to interest and prepare more underrepresented students for college and careers in STEM. Recently, Tuskegee University was awarded an NSF Math Science Partnership grant to develop and deliver Nano Science content for middle schools in the Alabama Black Belt. This partnership among 5 universities, K-12 and industry offers tremendous potential for improvement of K-12 academic outcomes in one of the nation's

most economically challenged regions. The project provides an opportunity for science-rich institutions to engage their surrounding communities, providing students access and opportunity for academic achievement in STEM. As a partner in this MSP project, SECME provides a delivery vehicle for the innovative content being developed by the MSP partners through its annual Summer Institute. Utilizing the SECME framework for professional learning communities led by Master Teacher Mentors who follow participants' progress and support implementation, SECME provides an opportunity to enhance the impact of the content developed. SECME also extends the project impact with its student competitions and projects and parent engagement strategies. This session will provide examples of the content modules in Nano science developed by participating faculty geared toward middle school. We will discuss strategies used to integrate the Materials Science concepts with 6th, 7th and 8th grade teaching standards and the process for training educators. The session will provide data from the first two years' evaluation of the SECME Summer Institute and discuss the Institute as a vehicle for improving STEM instruction in under-served communities. The partnership of SECME with the Tuskegee Nano Bio Math Science Partnership for the Alabama Black belt offers a unique opportunity for research, evaluation and improvement of the content, tools/processes for delivery of professional development and the evaluation of its efficacy and impact over time and in the classroom.

Increasing the Aptitude and Confidence for Computer Science and Engineering in Texas Rural High Schools

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During the last decade, there was a steep drop of freshmen undergraduate enrollment in Computer Science and Engineering, especially for minority students. While enrollments are picking up slowly in the last couple of years in the general population, the enrollment of minority students (especially female students) is still considerably behind. Rural high schools in the nation, especially Texas, face specific challenges of funding and teacher availability for incorporating computer science courses in the high school curriculum. The goal of this project is to increase the aptitude and confidence for Computer Science and Engineering in Texas rural high schools. The approach in this project is to use a novel method of introducing computer science and engineering as a "fun" activity in the high school technology courses by using a "continuous engagement" model. In addition to this, several other steps were used such as professional development for teachers, many tours of university computer science and engineering departments by high school students, computing competition, as well as summer (fun) computing fiestas (summer workshops) for high school students. In this paper, the general approach and efforts to achieve the above goal is briefly discussed. Preliminary results of the first two years of the project are discussed. Recruitment of minority students, especially female students, still remains a challenge and some of the lessons learned from the project are discussed. The project is funded by the National Science Foundation (NSF) under its Broadening Participation in Computing (BPC) program.

First Year Engineering Retention

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A two week program was initiated summer 2012 at the University of South Alabama for high-achieving incoming engineering students. The program introduces students to two highly popular areas: robotics

and composite materials. The participants are exposed to a graphical programming tool, LabVIEW™, which is widely used in engineering curricula, and use the tool to program LEGO MINDSTORM® robots. This combination provides immediate, visual, verification of project solutions. The students quickly gain skills and facility with both tools, creatively addressing the various assigned tasks. The program has been highly successful in capturing the interest of the participants and has led to increased retention of these students in engineering.

STEM Modules: Developing Innovative Approaches to Enhance Student Learning

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In order to increase the pool of students pursuing science degrees at higher educational levels, it is imperative that we expose students to high quality STEM education at early stages. Hence, it is critical that higher-ed and secondary systems partner to develop science materials that will transcend the traditional barriers (access to proper materials, restricted time periods, science equipment, etc.) that are limiting STEM learning within the early learning settings. To that end, through a NSF funded Math and Science Partnership grant, which provides funding for creating partnership among various Alabama schools and universities, we have developed several hands-on STEM modules that use various innovative approaches to expose students to various science concepts. To measure student learning, a pre-test and post-test were given before and after implementation of the STEM Module, respectively, within the middle school classroom. Data collected before and after implementation of the modules revealed that students' knowledge of STEM concepts dramatically improved after implementation of the STEM module activities. In addition, a "student-friendly survey" was given at the end of each module session to measure the clarity and impact of all module activities on students' perception towards module learning.

SESSION E: FLIPPED CLASSROOM AND NEW TEACHING CONCEPTS

An Innovative Method to Apply the Flipped Learning Approach in Engineering Courses via Web Based Tools

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The concept of a flipped classroom requires the students to view basic theory and material before entering the classroom. This leaves adequate time for the professor to interact with the students during in-class problem solving sessions. This concept of a flipped classroom is not new; it is the authors' assumption that many professors currently ask students to read material in order to prepare for upcoming classes. However, confirming that the material has been reviewed by the students may be difficult and time consuming. The widespread use of computers and the internet now introduce creative ways to deliver pre-lecture material while ensuring that the students have completed the pre-lecture assignments

before coming to class. This document explains a method that is currently being used in MECH-310 (Dynamics). The students are required to view pre-lecture videos before entering the classroom. The pre-lectures have been created by combining a LiveScribe™ Pen and TechSmith Camtasia® screen capturing software. The results of anonymous student surveys and final exam scores verify that this method is effective and well accepted by students.

Use of Visual Worksheets in Structural Engineering Classes

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In a traditional mode of engineering lecture, the lecturer leads the class presentation, shows the principles and identifies essential elements and students merely passively listen to the lecture. Passive methods of learning, such as listening, do not require students to make neural connections or conceptualization. Instructors have to develop systematic strategies that facilitate student engagement in such a way that students can develop behavioral skills and habits that lead to increased academic achievement and greater involvement with classroom activities. Adequately designed visual worksheets for structural engineering may reduce the mismatches between the teaching and learning styles by utilizing the synergetic relationship between visual and mathematic understanding for both sensing and intuitive learners. Class evaluations and mid-term assessments show that the majority students strongly support the teaching strategy using visual worksheets. However, the teaching methodology requires rigorous assessment in order to measure its genuine effectiveness in structural engineering education.

Engaging the Freshman Engineering Classroom

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This paper will recount the successes and challenges encountered in implementing a new classroom environment for a two-course introduction to engineering sequence at a mid-sized, regional university. The author will share the framework for the implementation, which includes the use of flipping content with Panopto lecture capture software, Softchalk activity development, Turning Technologies clickers, and use of a peer mentor. These pedagogical and technological components were brought together to create a very active and engaging experience. The author will also share techniques used to help the students understand the reason and benefit behind the new structure. This effort was supported as part of the university's Center for Instructional Innovation's Course Redesign Cohort program, which strives to develop a growing cohort of expertise on course redesign. The first semester of the revised freshman engineering sequence was conducted in fall 2013. Preliminary analysis shows improvement in the pass rate for the class as well as increased retention to the second semester course. There was also improvement in student work submission trends, which fell off less towards the end of the semester than in previous offerings. Student feedback also showed the students liked this format better than the former "active-collaborative/lecture" structure. In particular they liked having the video lecture components available for review, as well as the opportunity to use class time to practice problem solving, and they liked the "gadgets". From an instructional standpoint, the new structure made it easier to quickly identify strengths and weakness in the class as a whole and adjust content delivery and review accordingly. Overall, the result seemed to be a stronger, more engaged and successful cohort of students. The

redesigned pedagogy will continue in the spring 2014 second part of the sequence, and results will be presented.

SESSION F: HANDS-ON LEARNING AND DESIGN II

Teaching Engineering Material to Industry Technicians and Engineers

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Today's skilled worker shortages are extremely broad and deep, cutting across industry sectors and impacting more than 80 percent of companies surveyed. This human capital performance gap threatens our nation's ability to compete and is emerging as our nation's most critical business issue. Teaching engineering course materials to regular students has an established record. Students learn the theory and then during the laboratory and projects the theoretical principles are applied. Students usually spend one or more semesters to learn the subject and apply them in the practice. However, teaching a new subject to technicians from industry has its own specific challenges. All this suggests that technician education is more difficult than the education of scientists and engineers. However, the technician is expected also to be highly skilled in acquiring data, caring for instruments, and producing error-free results. Unless technician education is designed very carefully so that real needs are determined and addressed, it will be packed with so much science and mathematics that technician skills will never be learned. These factors explain why so many technicians complain that their academic study was useless for their work. Purdue University Calumet College of Technology in collaboration with one of the leading manufacturers of the automation systems has established a training center to teach automation hardware and software to technicians and engineers from the industry. This paper presents the collaboration and the challenges of the center. The student recruitment, teaching environment, material updating, student feedback, collaborative industry response, reaction and accommodation, student assessment and current status of the center also will be presented in this paper.

Development and Delivery of a First-Year "Construction Management Experience" Course

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All academic programs at NDSU have a first-year (freshman) course. However, many of these courses are not "hands-on" in the sense of providing students with actual work related experiences that can be seamlessly transferred to subsequent coursework or summer internship experiences. The Department of Construction Management and Engineering has a first-year course, CM&E 111 – Introduction to Construction Management and Engineering. This course introduces students to the construction industry primarily through the use of guest speakers. However, there was a need to restructure this course to provide a hands-on "construction management experience" that mimics actual construction management job functions and responsibilities in order to prepare students for subsequent coursework and eventual employment. The basic methodology for this "revised" course used the Tektōn Hotel Plaza Set[6] which is a girder and panel building kit. This kit was used in innovative ways to introduce students to the entire

array of construction management functions and responsibilities that are required for a typical construction project, i.e., construction documents and codes, material estimating, project scheduling, procurement and delivery, actual construction, inspections, change orders, project delivery, demolition, and a final project report. The "revised" course was delivered during the 2012 Fall Semester to sixty-five (65) students. Student feedback was extremely positive.

Tying Together Means and Methods in a Methods of Construction - Concrete and Masonry Curriculum

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Within the construction industry there has always been a demand for skilled management that has an understanding of the concrete processes happening on the jobsite. Managers are expected to be able to answer questions ranging from estimating to constructability within the concrete industry. Without exposure to methods being performed mistakes can and will happen. The goal of Pittsburg State University's School of Construction is to provide these hands on experiences within the management classes offered in the Bachelor of Science in Technology – Major in Construction Management. This paper will focus on the laboratory experiences within the Methods of Construction – Concrete and Masonry course that compliments the management objectives taught within the classroom. There are five focused labs that aim to increase the student's mathematic skills, estimating skills, and constructability skills in the class. The five labs include small building layout and wall form erection, batter board with slab-on-grade placement and rebar installation, tilt-up /precast wall panels erection, equipment operation, and a masonry wall erection. Within these labs students gain an understanding of methods that are required for the completion of a task and then better understand how to complete an estimation of needed material quantities for a project.

SESSION G: GLOBAL ENGINEERING

Creation of an International Engineering Student Exchange Program

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This paper describes, from the perspective of two U.S. universities, the creation of an international engineering student exchange program, involving universities in Canada, the United States, and Mexico. The program was funded by the Department of Education in the United States, and by the equivalent government agencies in Canada and Mexico. The program provided travel subsidies for engineering students to travel to study engineering at a partner university in another country, either by taking classes or by doing a research internship. The theme for the program was energy efficiency. This paper describes the process used to put the program together and to administer it. Experiences, both good and bad, and lessons learned are presented.

Global Experiences: Short Term Study Abroad Programs for Engineering and Technology Students

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Faculty in the Purdue School of Engineering and Technology, Indianapolis on the Indiana University-Purdue University Indianapolis (IUPUI) campus, have created a number of short-term faculty led study abroad programs for undergraduate engineering and technology students. Each program has a partner university in the host country and a specific theme to their program, i.e. sustainability, motor sports, and computer graphics. These short-term study abroad programs are generally one to four weeks in duration in the foreign country with pre- and post classes on the IUPUI campus. The short-term courses were created to offer non-traditional students who have full time jobs, family obligations, or internship opportunities in the summer a chance to study abroad. The international study abroad programs described in this paper generally consist of visits to industries, businesses, municipalities, or universities to meet with experts to hear presentations and see demonstrations. For example, the mission of one of the programs is service learning where computer graphics is taught to foreign students and/or faulty. In addition in all the courses, students learn first hand about the culture of the country where they travel. Students earn between two to three credits depending on the course. In addition, students earn a RISE (Research, International, Service, Experimental) credit on their transcript. All IUPUI students are encouraged to earn at least two RISE credits before they graduate. IUPUI offers scholarships, especially to those who have never studied abroad, in order to encourage more students the opportunity to study overseas. Typically, the School has between four to eight scholarships for students to study abroad. This paper will discuss each short-term study abroad program, the benefits, and lessons learned for students, faculty and the university.

Is "Sustainable Development" in Construction Actually Sustainable?

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In the construction industry, the trend of “Sustainable Development” has gained tremendous momentum over a short period of time. The United Nations in its 1987 Brundtland Report defines, "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The idea of sustainable development has been further broken down into three parts: environmental sustainability, economic sustainability and sociopolitical sustainability. The driving force behind sustainability has been derived from the perception of effects on the environment, most notably, global warming. However, events of recent years have put into question the absolute certainty of global warming. If the environmental aspect is indeed not necessary, can the concept of sustainable development be justified based solely upon economic and sociopolitical factors? Given the current state of the economy in the United States, as well as the rest of the world, this paper will look on the economic factor of sustainability in construction. While there are many areas in construction that can be investigated, this paper will focus on Residential Building Construction. It is the initial opinion of the author that creative thinking and a great deal of further development is needed to bring sustainable development to a point where it is a viable form of construction (from the economic sense) and be able to stand on its own based upon function and cost effectiveness without the need for justification by other means.

SESSION H: EXPERIENTIAL AND PROJECT-BASED LEARNING I

Project-based Education on Sustainability Principles for Engineers

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Sustainable Development is defined as any development that meets the needs of the present without compromising the ability of future generations to meet their own needs. With noticeable global climate change, unprecedented amount of waste generation, increased demand on water, energy, and other natural resources -- conservation and use of alternatives in infrastructure design and construction will become standard practice for future projects. All branches of Civil engineers play a vital role in designing sustainable projects and in shaping and achieving the sustainability credentials for a project. Traditionally, classroom courses tend to place more emphasis on theory, with limited integration of real-world engineering problems and applications. The paper describes components of an undergraduate course on sustainability principles for engineers and provide example of how the rating tools LEED, Envision, and Sustainable Sites were incorporated in evaluating real-world civil engineering projects in Louisiana.

Enhance Multi-Disciplinary Experience for Agriculture and Engineering Students with Agriculture Robotics Project

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With the advancement in robotics technology, unmanned agricultural robotics are becoming widely used in precision agriculture. Engineers equipped with robotics knowledge are highly demanded by today's high-efficiency-high-producing agricultural industry. It is critical to offer agricultural robotics training to ensure that undergraduate students are adequately prepared for the agricultural industry job market. To answer this demand, the authors build a fully operated agricultural robotics lab within Prairie View A&M University (PVAMU). An Unmanned Agricultural Robotics System (UARS) was designed, constructed, and operated in both classrooms and fields. The UARS is a precision agriculture vehicle platform for mounting multiple sensors, including crop height sensor, crop canopy analyzer, normalized difference vegetative index (NDVI) sensor, multispectral camera, and hyperspectral radiometer. Such a ground-based automatic crop condition measuring system also will help farmers maximize the economic and environmental benefits of crop pest management through precision agriculture. The UARS was tested under both laboratory and field conditions. Based on the success of the project, a special topic course was developed and offered for undergraduate students in the Department of Engineering Technology, and also several senior project tasks about building agricultural robotics system were advised. Through these activities, both agricultural and engineering students gained hand-on experiences on technologies of various engineering disciplines, including agricultural, mechanical, electrical, and computer engineering. Students increased their confidence in pursuing future career opportunities in the abovementioned areas, especially in agriculture. By doing so, not only the students were equipped with cutting edge technology but also they will be more competitive in their future careers. The teaching

project also provided a platform for collaboration among educators from diversified disciplines for enhancing agricultural and engineering education at PVAMU.

Building Confidence through Hands-on Activities

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Living WITH the Lab is a first-year engineering curriculum that serves over 400 students each year at Louisiana Tech University. This year-long, three-course sequence uses student-owned software, tools, a robot kit, and an Arduino microcontroller to provide a mobile laboratory and design platform. At the end of each term, students are asked to report the number of times they have completed each of 26 hands-on activities (using hand tools, measurement instruments, etc.). They are also asked to rank their confidence in broadening activities, non-technical skills, technical skills, and course-specific areas. This paper examines the relationships between number of times a student engages in hand-on activities and their confidence. The assessment data show that the number of hands-on activities has increased fifteen-fold from the previous curriculum and student confidence is high, particularly on items related to the highest frequency activities.

SESSION I: ENGINEERING CURRICULUM INNOVATIONS II

Teaching an Engineering Lecture in an Open Teaching Concept Classroom

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To properly respond to the economic, social and environmental challenges of the coming century, an increased number of engineers will be required. Moreover, global interconnectedness will require a more diverse population of engineers to work in unison towards finding solutions for new problems on a global level, as well as the initiative to do so. Diversity should never be limited to factors such as race or creed, rather, gender and culture must also be included to further engineering education as a whole. A truly diverse perspective is crucial in addressing the multi-disciplinary, global problems faced by contemporary societies. The classic days of old world belief and principles cannot sustain or survive in any modern, evolving scientific field and therefore must be allowed to pass to make way for programs that embrace new gender, personality and cultural diversity. The crux of education, especially in a field as ever changing as engineering, is its ability to change and adapt. Students must have cross-cultural exposure, diversity-related coursework. This paper will focus on providing information in conjunction with the "Open Teaching Concept that Texas Tech University that was founded in 2012 under the program of "Teaching Diversity Across the Curriculum: Open Teaching Concept" by the Cross-Cultural Academic Advancement Center (CCAAC) and faculty members involved in it's teaching, learning, and connecting (TLC) through the Diversity Advisory Council. The students involved had several opportunities to engage personally and professionally in meaningful cross-cultural explorations and other enlightening activities.

Building the Pipeline: Developing a Symposium to Prepare Engineering Students for Graduate School

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With the support of an NIH Ruth L. Kirschstein National Research Service Award program grant (T32EB007507), we established a graduate training program in Imaging Sciences and Informatics in Biomedical Engineering (BME) at The University of Texas at Austin in 2009. As stated by the NIH, "The overall goal of the NIH Ruth L. Kirschstein National Research Service Award (NRSA) program is to help ensure that a diverse pool of highly trained scientists is available in appropriate scientific disciplines to address the Nation's biomedical, behavioral, and clinical research needs." To achieve this goal of developing a diverse pool of scientists, we have invested nearly five years into an ongoing endeavor to build a lasting relationship between the home institution of our graduate training program (UT Austin) and The University of Texas-Pan American (UTPA), which predominately serves the Hispanic population of South Texas and has high quality undergraduate engineering and science programs. A key challenge that we have identified through this partnership is preparing students from underrepresented groups for the admissions process and subsequent success in graduate school. To address this difficulty, we organized a pilot symposium in April 2013 through which a small group of undergraduates (mostly 2nd year students) and faculty members from UTPA engineering programs visited our department at UT Austin. This two-day symposium was financially supported by the UT Austin BME Department. A current trainee (Daniela Santiesteban) was instrumental in organizing the contributions of current graduate students to the event. The symposium included: presentations by UT Austin staff, faculty, and alumni about the graduate school experience and the application process; lab and campus tours; panel discussion with current graduate students; sample of research presentations from faculty; and opportunities for informal Q&A over meals. In this paper, we discuss the short-term outcomes of the symposium and discuss strategies for future expansion and improvement.

Translating an Honors Introductory Engineering Course for a Non-Honors Electrical and Computer Engineering (ECE) Population: Initial Data

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Throughout the past five years at The University of Houston, a first-year program has been developed and refined for a small group (approximately 50 students per semester) of honors engineering students. Through that program, the level of technical achievement in the first-year honors students increased significantly, as did the motivation levels of the students. The purpose of this paper is to present the preliminary results of a pilot introductory PBL course in ECE that scales up an existing honors engineering first-year program that had already demonstrated success. Issues encountered and best practices learned from adapting a multidisciplinary honors engineering PBL course to a single discipline non-honors PBL course will be presented and discussed. The research question guiding this study is therefore, “How do motivation and self-efficacy levels differ between honors and non-honors engineering students in a first-semester project-based course?” A paper survey was administered to students in both the honors version of the Introduction to Engineering course and the non-honors version. The honors students were a multidisciplinary group of 52 students enrolled in the university’s Honors Engineering Program. The ECE group consisted of 101 students who were enrolled in the ECE program or who intended to apply for admission to the ECE program. Self-reported data from both groups were collected.

Descriptive statistics and effect sizes for measures of motivation and self-efficacy were analyzed and reported. Although there is quite a bit of literature concerning the benefits of implementing evidence-based instructional methods such as PBL in the classroom, there is considerably less literature addressing how PBL impacts different populations within engineering. This research informs those curriculum developers who are either in the early stages of creating new PBL courses in engineering or who are thinking of scaling up current PBL programs to a different population.

Getting Students Certified: A Study of Certification Pass Rates in Information Technology Degree Programs

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Students pursuing Information Technology (IT) degrees in college not only need to acquire the targeted degree, but also acquire numerous certifications. We have found that IT certification first time pass rates among students in our IT related degree programs tend to be quite low. Additionally, in order to pass these challenging exams, supplemental material must be utilized by the students in addition to the program curriculum. This study investigates the IT certification pass-rate of students enrolled in, or recently graduated from, IT programs in North Carolina Universities and Community Colleges. A survey instrument is used to identify the study methods and techniques found to be most useful by students who have passed certification exams. The strategies of the newly certified students are exposed for possible integration into our current information technology curriculums and to enhance instructional material. The results garnered from this study can be applied to aid information technology programs by increasing the certification pass-rate and potentially securing career objectives while adding value to new graduates.

A Preliminary Report on Adapting Software Development Industry Best Practices for Undergraduate Classroom Use

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This paper presents an experience in designing, implementing, and evaluating an undergraduate course which incorporates software engineering industry best practices. Equipping students with knowledge about practical software development is problematic in today's academic arena. Colleges teach students the principles of software development, but that instruction is mostly theoretical and abstract. Developing working software requires specific knowledge in software engineering industrial practices. The traditional university curricula do not address these areas in any depth. We have taken a first step in departing from the traditional curricula by orienting an undergraduate course to software engineering practices. Course material on software engineering, including software process, is readily available. What is missing is the mechanism to expose students to real-world software issues encountered in the software industry. Using the four aspects of engineering as a starting point, we cataloged a number of common industry practices for accomplishing analysis, design, construction, and test. In this paper, we describe the design and implementation of the software engineering course, and then present the preliminary results and observations from the course.

SESSION J: HANDS-ON LEARNING AND DESIGN III

Hands-on, Project-based Education in the Classroom to Solve a Real-World Problem

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Majority of engineering courses stresses more on theory and very little on hands-on, project-based learning in the classroom. Integration of real-world engineering problems and applications in the course will generate engineers, who will be technically sound and be able to execute and manage real-world projects, when they join the workforce. The companies will get employees who will take less time to acclimatize themselves in real-world problem-solving situations. This paper discusses components of a graduate-level engineering course taught at the University of New Orleans, in which the students are required to participate and complete a class-project based on real engineering tools and concepts used regularly in the industry. The paper demonstrates the benefits of integrating hands-on, project-based learning in the classroom and provides examples of how students can get involved with data acquisition and analyses from a real world project.

Establishing Collaborations between Academia and Industry through an Undergraduate Engineering Course

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Traditionally, classroom-engineering courses tend to place more emphasis on theory, with limited integration of real-world engineering problems and applications. Additionally, students work mostly on their own, thereby failing to learn the importance of working in a group and developing effective interpersonal communication skills. Employers want entry-level engineers to be technically sound and possess a variety of professional and interpersonal skills, so they can work effectively as part of teams to execute and manage real-world projects, communicate well, and understand the economic, social, and political aspects of their professional activities. Engineers need these skills to maximize their importance and value in society and to fulfill society's expectations of engineers. These professional expectations complicate engineering education in universities worldwide. Lack of appropriate practical skill acquisition in engineering education is a topic of debate and concern in academia and industry. This presentation will discuss components of an undergraduate Engineering course taught at the University of New Orleans. It will demonstrate the benefits of establishing collaborations between academia and practitioners. The presentation will also show the importance of real-world, problem-based learning in the classroom, where students work in small groups under the direction of professional engineering practitioners, who serve as (1) supervising mentors to the students and (2) client representatives. During an academic semester, mentors guide students to complete real-world engineering projects from start to finish, and motivate students to improve on their interpersonal communication and presentation skills. This interactive, hands-on experience helps students understand better the application of theory in real-world projects, and it gives them opportunities to make valuable professional contacts. The mentors, on the other hand, enjoy giving back to their profession and, as a side benefit, meeting potential employees. Course outline, components of the real-world class project, and assessment criteria will be shared during the presentation.

Krisys Robot: Experiential Learning in Product Development

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Texas A&M Electronic Systems Engineering Technology (ESET) focuses on innovative product and systems design and development. To this end, the ESET curriculum includes a Sophomore-level course in digital logic that provides one of the first opportunities for ESET undergraduate students to design, build, test, optimize, compete and document an autonomous robot. The final course project integrates all of the fundamental concepts taught in the course for both combinatorial and sequential logic circuitry. These logical circuits form the basis for the creation of the Krisys Robot which is a student-created autonomous robot capable of self-locomotion.

Hand Activated Non-Obstructive System (H.A.N.S.)

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The National Aeronautics and Space Administration (NASA) agency spends millions of dollars on various robotic platforms, and this drives the need for a cost efficient robotic platform. An example of a cost-efficient robotic platform is one that uses a non-traditional form of control, such as hand gestures. Furthermore, NASA is interested in having direct control of the robot's movements, as well as the ability to trigger preloaded autonomous commands. To help NASA evaluate this new technology, a prototype called Hand Activated Non-Obstructive System (H.A.N.S.) is being developed by a team of undergraduate students, as part of their Capstone Design course in the Electronic Systems Engineering Technology (ESET) program at Texas A&M University. This paper describes the design of the H.A.N.S. prototype that will use the iRobot Create platform as the target system. NASA seeks to evaluate and investigate this cost-efficient robotic platform that can perform similar tasks as a costly robotic platform and be taken on space missions. If something were to happen, the cost-efficient robotic platform can be left behind. However, this prototype will only be used for demonstration and a proof of concept and will control the iRobot Create through the use of hand gestures in order to demonstrate the use of a nontraditional form of control and investigate its limitations. Additionally, the H.A.N.S. prototype will investigate any possible limitations to the hand gesture methodology.

Using GoPro Hero Cameras in a Laboratory Setting

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The design, implementation, and student perceptions of using cameras in a required engineering materials science laboratory are examined. GoPro Hero 2 cameras were used in a class laboratory setting to improve understanding of material failure mechanisms as well as increase student motivation in a materials science course. Students recorded video footage of destructive materials testing using GoPro cameras in order to evaluate material failure and develop a video presentation in lieu of a written

laboratory report. Surveys given to the students after the semester was complete indicated a perceived an increase in their understanding of material failure concepts and the ability to share technical information with others. They rated the value and overall course higher when they used the cameras in the laboratory.

Who Says You Can't Teach Sophomores Design: Interacting Through the Design Process

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Students at Tulane University are required to take Product and Experimental Design, a course that introduces them to the design process and the various disciplines of biomedical engineering. Through team projects geared toward translating bench research into product development, students are challenged to begin thinking critically and applying physical fundamentals to complex systems. The objective of this presentation will be to share effective strategies for engaging sophomore engineering students in a design course. We will share in class workshop-style activities used to enforce specific phases of the design process and the pedagogical philosophies that they reinforce. As an example, we will step through a brain storming exercise that forces students to generate, share, and integrate conceptual solutions to mitral regurgitation. The "teaching with the students" approach enables the introduction of specific didactic material and student empowerment.

WORKSHOP E: "ENGINEERING INNOVATIONS IN DISTANCE LEARNING"

A Case for MOOC's

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Many people have heard of a revolutionary trend in education – Massive Open Online Courses, or simply MOOCs, and they have created quite a bit of controversy. They were initially hailed as a savior from higher education costs a few years ago when several universities transformed traditional courses and put them online for free. The class sizes are limitless and anyone with a computer, internet access and a desire to gain knowledge—anywhere in the world—could join in. However, when the notion began that participants in these courses should be given college credit for them, controversy erupted. While the MOOC movement has seen a good deal of success and numerous other colleges have joined in, the dropout rate in MOOCs has been staggeringly high. This presentation entitled "A Case for MOOCS" will provide an overview of MOOCs, how they originated, their current state, and where this trend might be headed.

Introducing Project-based Team Research into a C++ Programming Course

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Introduction to C++ Programming is a required course by 5 programs in the College of Technology (computer, electrical power, mechanical, biotechnology, and computer information systems) with annual

enrollment of more than 400 students. The course is mainly delivered face-to-face, but one section of the course was delivered online in the past. The course is suitable for students with little or no programming experience, yet offers the depth and rigorous treatment of theory and practice demanded by traditional C++ courses. Funded by the Quality Enhancement Program (QEP) at the University of Houston (UH), we have revised the course to introduce research component and broadened the scope of 1 or 2 programming assignments to become a term research project. Students are required to collaborate in a team of 4-5 members to jointly search, identify, and solve a real-world problem. In this paper, results of this study after offering the course for one semester will be presented.

Creating On-Line Materials for Computer Engineering Courses

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Recent fast growing computer techniques have made tremendous change to the way we live. Educational methods are also influenced by computers and computer networks. Educators have adopted all kinds of tools to enhance course curricula and teaching materials. As a result, computer based courseware development has been dominated for the past decades. Popular teaching environments range from virtualization, gaming style, online courses, and etc. Those new teaching and learning modules improved the teaching quality by breaking traditional class setting and encouraging more students' interaction. Nowadays on-line courses are offered in many art and science subjects while it is challenging to extend it to engineering territory because most of the engineering courses have hands-on experiments. In this paper, authors shared their experiences on on-line course development with a focus on Computer Engineering related subjects.

Enhancing Students' Learning Process through Mobile Applications

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Mobile learning has become an important trend for various subject areas including computer science and engineering. These mobile devices provide anytime, anywhere learning opportunity for students. We have used App Inventor from MIT to develop our mobile app for Android operating system. This application consists of two portals: teacher portal and student portal. By using teacher portal, faculty member can develop questions for a particular chapter of a course or any subject. Through the student portal, students can view the questions and take a test. Depending on the nature of questions developed such as multiple-choice questions, the portal can grade it, analyze it and display it in a graphical format to show the individual students performance. Faculty member monitors student's performance and provides specific guidance accordingly.

Innovation is the Name of the Game: A Case Study of an Online Course in Engineering and Technology

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Engineering Technology and Industrial Distribution
Dwight Look College of Engineering
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In an evolving online education environment, innovation is a key factor in advancing the state-of-the-art. The advantages of distance learning and online education are well established. Many institutions of higher and continuing education in the United States and around the world have online systems and mechanisms in place, delivering effective and robust online education to the learners. Here is discussed a case study of an online engineering course that required innovation in the structure of the course content and in the course presentation to accommodate all learners, including well-prepared and underprepared ones. This has been a three-phase online course, undergone three phases of revisions and improvement in three semesters using the students' feedback. The course is well delivered and received, based on the feedback and anecdotal evidence. The overall assessment provided evidence that in the current distance learning environment, innovation is the name of the game.

SESSION K: SIMULATION AND VISUALIZATION TECHNOLOGIES

Visualization and Simulation for Path Planning Using MATLAB

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This work focuses on using MATLAB as an analysis tool by exploiting MATLAB's graphical functionality and modularity. The simulation and visualization capabilities of MATLAB are very useful for both engineering education and research. In this paper MATLAB is used to develop a test-bed to graphically model mission planning work to convey a visual representation of flight paths and their variability- i.e. altitude, timing, etc. The graphical representation allows visual feedback when investigating path planning algorithms that deal with escort missions. The modularity of MATLAB allows us to test different algorithms and modifications with minimal change to the framework- allowing algorithms to be chosen and updated as needed. We use the A-star algorithm, a common path planning algorithm, to illustrate the use of MATLAB, and the efficiency at which we can calculate paths and give feedback. A similar graphically enhanced simulation approach is possible for studying a wide-variety of engineering problems.

Enhanced Learning Experiences through Effective Use of Simulation and Visualization Technologies for Demonstration of Environmental System Modeling

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Learning experiences with simulation and visualization tools can greatly enhance a student's ability to seamlessly integrate mathematical modeling and attain a generalized understanding of environmental phenomenon. Environmental modeling relies heavily on system-based approaches to generalize environmental processes and make spatial and temporal predictions about the environmental fate and transport of anthropogenic pollutants. In the Fall 2013 semester, we have effectively used STELLA software for classroom simulations and visualizations to demonstrate the effectiveness of a system-based approach to model environmental processes. Various real-life examples were mathematically modeled and later simulated using the STELLA software. The STELLA software offers robust simulation and visualization compared to traditional EXCEL software. This study documents the effectiveness of STELLA software in modeling selected environmental processes such as transformation and deposition of sulfur dioxide, transformation and metabolites rate kinetics of atrazine. It includes an assessment of the practical applications of the STELLA environment through direct questions related to the design of stock and flow diagrams for the degradation of perchloroethylene and associated difference equations. The modeled environmental phenomenon was not only simulated using STELLA, but also tested through statistical methods such as chi-square and paired t-distribution tests to be certain the simulated model was valid at least at a 95% confidence level.

Enhancing Civil and Construction Engineering Education through the use of a Web-based Collaborative Simulation

Thomas Korman
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Simulations and learning games create real-world experiences to provide the opportunity to engage, have fun, and truly learn. Many have been designed to meet specific learning goals, i.e. sharing case studies to demonstrating very complex situations. The practice of civil and construction involves being able to make decision to balance time, cost, quality, resources, and identifying and solving a variety of issues. As the millennium generation enters the higher education system many have spent countless hours playing computer games as they have in the classroom during their lifetime; therefore, it is a natural transition that our learning environments begin to use techniques from the gaming world. The skills required of today's construction engineers are a combination of technical knowledge and management skills. This paper describes the development of web-based simulation designed and developed at California Polytechnic State University, San Luis Obispo to educate civil and construction engineering students.

SESSION L: COLLABORATIVE AND DISTRIBUTED LEARNING

Facilitating Collaboration Across STEM Fields in Program Development

James Ejiwale
Jackson State University

Supporting learners at different stages of learning is essential to achieve positive learning, critical thinking, technical and problem solving skills, and gainful employment upon graduation. For any program to prepare students with skills necessary to supervise and manage the future workforce of any organization successfully, necessary tools must be utilized for the success of the collaborative effort. In

this presentation, need for facilitation in STEM education, leadership skills development, knowledge sharing and management among collaborators, the educational aspects of research facilities and research clusters as some of the tools necessary to develop program through collaboration in STEM fields will be presented.

Improving Student Persistence in Computer Programming Courses with Pair-Testing

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Department of Mathematics and Computer Science

In recent years, enrollments in computing majors have started climbing after a precipitous decline that lasted several years. Though enrollments have started climbing, attrition in computing majors is still a problem. The attrition rates in computing courses are as high as 30% nationally and most of the attrition happens during freshman and sophomore years. Indeed, if left unaddressed, high attrition rates could easily negate the about said enrollment gains. Motivation and involvement are vital tools to address the above said attrition problem and retain students in computing majors. Collaborative learning tools such as pair programming are widely used to address the retention issue and motivate the student programmers to complete their jobs. Since pair programming is not beneficial and/or not possible to practice today's academic environment, we have used pair-testing as a collaborative learning tool to improve the students persistence in computer programming courses. It is expected that pair-testing, as a collaborative learning tool, will retain the benefits of pair programming while at the same time downplaying its drawbacks. In this paper, we describe the design and implementation of a pair-testing model for a computer programming course (Software Engineering I), and then present the results of an evaluation of the model.

Reviewing Circuit Basics Through the Use of a Card Game

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Three problems regularly occur when covering electronic circuit basics in lecture: (1) the brightest students already know the material and mostly finish early, are bored, and talk to each other, (2) The struggling students continue to struggle, becoming frustrated and bored and unlikely to get the attention they need to understand the material, and (3) series and parallel circuits are essentially very simple, so a professor creating circuits for lecture must remember which values are on the exam and try to avoid them. A card game has been designed in order to address these problems and enhance learning. Over the course of this card game, students must form groups of four of five and solve circuits together. The students get bonus points for each circuit they solve, but only if all members of a group provide the correct information. This paper and presentation will show how the Circuit Card Game is played and run.

Improving Teaching by Eliminating Student Dislikes

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Teachers often do things in the classroom that either build negative or positive rapport with students. This paper is focused on identifying those things that elicit strong negative responses from students and especially those that are readily controlled by the teacher. Teachers often have a sense of things that alienate students, yet it is important to explore this topic since it has such a strong impact on student learning. It is proposed that most of the things identified in this paper require little teacher effort to either avoid or adopt. From this study, the top five things engineering students dislike are: (1) teacher didn't work enough example problems, (2) teacher was difficult to understand, (3) teacher wasn't prepared for class, (4) teacher was boring, and (5) teacher used PowerPoint. Teachers should work to avoid practices that alienate students and likewise adopt or retain practices that engage students. Based on feedback from students about what they both like and dislike, it is suggested that teachers should strive to: (1) enjoy teaching, (2) work example problems, (3) speak to be heard and understood, (4) be prepared for class, (5) show enthusiasm toward the subject, and (6) avoid using PowerPoint.

The Integration of Collaborative Learning and Computer Technology in Biomedical Engineering Education

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Tulane University

At Tulane University, we have developed a course that is intended to bridge the gap between traditional mathematics 'tools-based' courses taken by undergraduates and the application of these tools to model biological systems. This course, 'Mathematical Modeling and Analysis of Biological Systems,' was developed initially as a graduate-level course, and has migrated to become required of all Biomedical Engineering undergraduates.

Our fundamental premise is that mathematical modeling becomes an interesting topic only when one becomes involved in the process. As such, this course has the following goals that relate to a collaborative learning process:

- To develop our students' interest in mathematical modeling;
- To develop our students' ability to develop analytical models of biological systems;
- To encourage the interrelationship between intuition and analysis;
- To develop group interdependence within and between groups;
- To develop presentation/teaching skills, and
- To establish an understanding of learning through teaching.

The purpose of this process is to help students to formalize and quantify their hypotheses, and test their models to determine whether the results of these models are consistent with observations and intuition. An important aspect of this process is the determination of model improvements. This presentation will describe the methods used in this course to involve our students in the collaborative learning process.

SESSION M: VIRTIAL REALITY- AND COMPUTER TECHNOLOGY-BASED LEARNING

Interactive Virtual-Reality Driven Learning Framework for Engineering and Science Education

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[2]Department of Mechanical Engineering
[3]Department of Computer Science
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The University of Texas at San Antonio has established a cutting edge Advanced Visualization Lab (http://vislab.utsa.edu) that consists of a large-scale high-resolution VizWall powered by a hybrid CPU/GPU LINUX cluster with 6,000 processors, and various latest visualization technology including large screen 3D stereoscopic display, immersive 3D Oculus Rift virtual reality device, Google Glass, multi-touch visual control, Lean Motion gesture control, haptic control devices, Kinect enabled model control as well as laser scanner and 3D printers. It provides us a comprehensive visualization facility capable of building a simulation and visualization pipeline from start to finish. In this paper, we first present a general framework on how to develop and integrate some of the visualization devices into the large-scale (14.5 x 6 ft^2) high-resolution (98 Mpixels) VizWall for interactive learning. Then, we discuss a few application examples that are built on this platform include classical engineering beam deformation, biomedical virtual surgery simulation, artistic application with Kinect to track a dancer so that a live video mask can be interactively controlled by the dancer's movements, as well as a football kicking simulation system to provide interactive visual-based feedback to both players and coaches with model-based coaching techniques for performance improvement and injury mitigation. With rapid advancement of today's technology, it can make learning of various subjects of engineering and science more interesting and effective by designing interactive and visually stimulating curricula.

Interactive Alternative Energy Educational Gaming in a Virtual Reality Environment

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University of Louisiana at Lafayette

The Alternative Energy Center game is a 3D game developed with the purpose of arousing interest and educating students in energy research. The game was developed using Solidworks, 3ds Max Design, and Unity 3D. The scene of the game was constructed using a scale model of the Cleco Alternative Energy Center in Crowley, Louisiana. During 2013, several demonstrations were given in a virtual reality lab at the University of Louisiana that explained solar thermal power concepts and other alternative energy technologies. These were given on three 150 inch screens in a concave design, immersing the user in a 3D educational experience. This paper explains the design process of the interactive 3D game and the educational experience from demonstrations during 2013.

Recommending and Selecting Appropriate Resources during On-line Problem Solving

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Georgia Institute of Technology

In this paper, we present a model of a personalized tutoring agent derived from a set of preliminary student data that was acquired using a web-based question and answering system. The system, called ITS, has been deployed in a second-year Signal Processing ECE course as an on-line supplement to the traditional homework. ITS allows students the opportunity to practice answering concept-centric questions and tests students' conceptual understanding through instructor assigned questions. The long term research goal is to develop an interactive learning environment that provides personalized tutoring via a set of questions and web-based content. Through a data-driven approach, we apply Hierarchical

Bayesian models to develop a probabilistic conceptual framework for establishing and tracking the conceptual state and growth of students as they interact with questions and course related resources. We present preliminary results from our system, and discuss ITS in the context of extensions to account for conceptual correlations, a priori labeling, and temporal prediction.

Using Coastal Louisiana to Develop Hydrologic Web-based Learning Modules

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University of Louisiana at Lafayette

The overall goal of the study is to utilize advances in research and technology to develop visual, case-based, data and simulation driven learning experiences. Three regional scale ecosystems provide the context for the learning modules, which are referred to collectively as “HydroViz” (www.hydroviz.org). This paper focuses on the development and implementation of web modules based on one of the three ecosystems, coastal Louisiana, which provides an abundance of concepts and scenarios appropriate for use in many water resource and hydrology curricula. Recent developments in hydrologic modeling, data and resources provide the core of the new learning modules. Developments also include an instructional interface and an instructor’s guide to provide guidance and support to both learner and instructor. The new modules are designed be instructionally and technically adaptable and transferable to independent institutions.

SESSION N: EXPERIENTIAL AND PROJECT-BASED LEARNING II

The Modular Integrated Stackable Layers System: A NASA Development Partnership

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Texas A&M University

The need for more advanced and powerful microcontrollers within electronic systems has increased significantly over the last several decades. While many hobbyists, by default, seek out Arduino platforms, industry typically have electronic systems custom made to suit their processing needs. In order to give industry, as well as hobbyists, a more power and cost effective embedded processing solution, NASA and Texas A&M University’s Electronic Systems Engineering Technology (ESET) Program have formed a partnership to further develop the Modular Integrated Stackable Layers (MISL) system, originally created by NASA. The MISL system is being expanded to utilize the RM48L952 microcontroller, produced by Texas Instruments. This “rack and stack” system was designed with standardized data and power buses so that additional boards, or layers, with specific functionality, may be stacked and easily integrated. This allows the user to mix-and-match hardware within the RM48 based system. MISL is being designed and developed as an open source hardware and software system to allow the technology community to continue development and customization of the system to meet their needs long after inception. Keeping the MISL system completely open source will in turn drive the cost of individual units down. This all provides a versatile, inexpensive, and space-qualified solution to the processing needs of new products and systems in a wide range of design and development environments including automotive, aerospace, medical, and oil and gas industries. This paper will provide an overview of the MISL systems’ current

status, its use within education, and the plans for the open community being developed by Texas A&M University in partnership with NASA.

Utilizing Commercially Available Products to Demonstrate Reverse Engineering Concepts in Electronic Systems Product Development Courses

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The use of a commercially available product provides a platform for demonstrating the process and value of utilizing reverse engineering concepts in both understanding the product design, and also understanding ways to develop a new product. The value of reverse engineering is readily demonstrated by selecting a product related to the student's discipline, discussing the processes and principles of reverse engineering and then performing those processes on a specific product has provided a platform that allows experiential learning through application of those processes. The laboratory curriculum is designed to give the students a basic understanding of product development stages, capabilities in circuit analysis and then utilize reverse engineering concepts and circuit analysis methods to produce the items necessary for product development. These items include a conceptual block diagram (CBD) as well as a functional block diagram (FBD). Utilizing these tools, processes and items, the students then prepare a series of presentations that demonstrate an understanding of the product and finally a recommendation for possible improvements. This approach is implemented in a single class approach that prepares students for an advanced capstone series where students develop a working prototype over two semesters.

Educational Project on Decision Support System for Precision Agriculture

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[2]Engieering Technology Department
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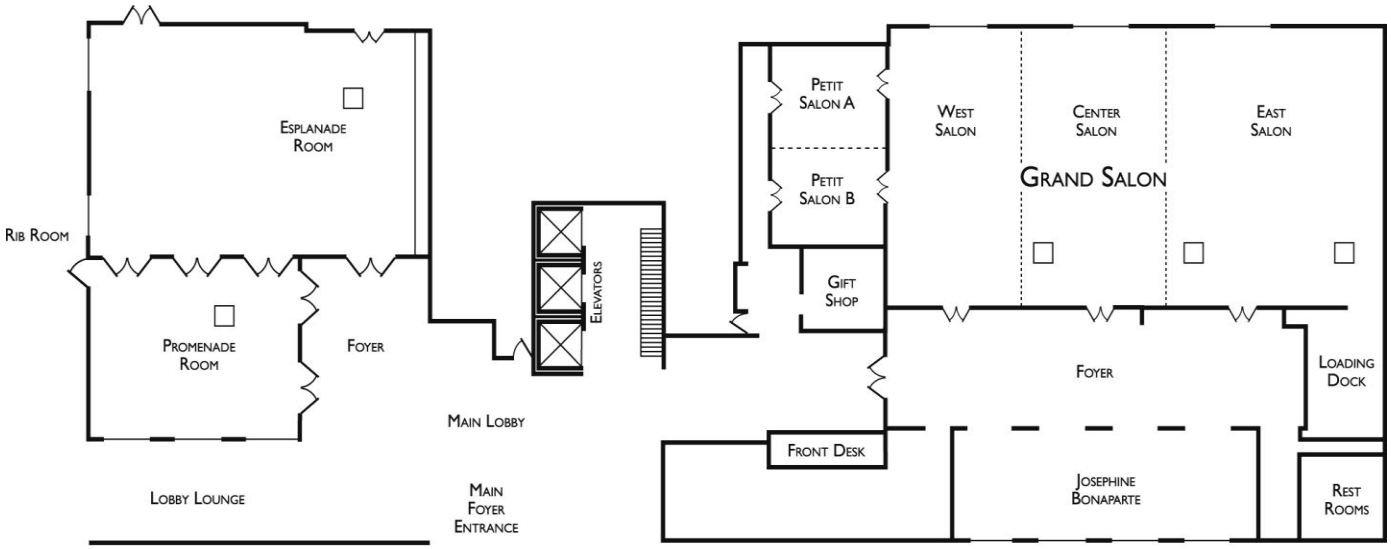
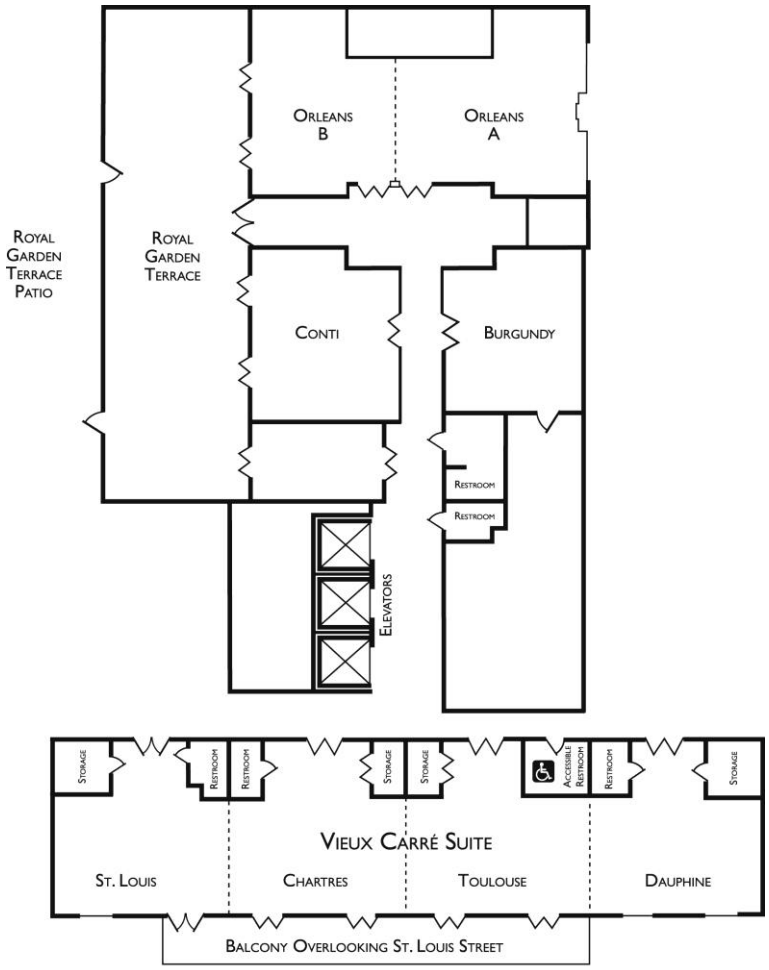
The agricultural industry faces a challenging task of sustaining the world growing population. Through the use of well-timed information gathering and proper decision making, the tasks can be facilitated with modern technology. In the 21st century, precision agriculture equipped with Information Communication Technology (ICT) and Decision Support System (DSS) is adopted in rural areas. ICT enables farmers to collect critical crops information and DSS guides farmers to understand and utilize the information to make correct decision. In order to educate current undergraduate engineering and agriculture students necessary ICT and DSS knowledge, a group of faculty from multi-disciplinary programs at Prairie View A&M University acquired funding from United State Department of Agriculture (USDA) capacity grant to establish a smart irrigation system DSS through wireless sensor network (WSN). This project will involve four undergraduate students annually for three years.

HOTEL FLOOR PLAN



First Floor



Second Floor